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MALIGNANT DISEASE OF THE THROAT*

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I MUST first express my high appreciation of the honour you have done me in inviting me to make a communication before this Congress.

I have chosen the term, throat, rather than the more confined and technical terms pharynx and larynx because, in many ways, the problem connected with malignant disease of these parts concerns them both and, in some aspects, not separately but together. The only apology I make in taking this subject for a communication is that it is so large and so full of difficulties that it is not in the power of any single observer to carry the elucidation of the problems connected with it very far. I can only urge in extenuation of my temerity that the subject has for long pressed itself insistently upon me. I have been tempted to follow the example of many laryngologists, perhaps of the majority, and to acknowledge the undisputed title of the general surgeon to this territory. I have wished that I could convince myself that this was in the best interests of the patients, but I am not convinced.

The improvements in the methods of examination of the food and air passages and the introduction and familiarization of the direct methods have confirmed me in the opinion that, at any rate, the examination of patients suffering from malignant disease of the throat, the detailed diagnosis,

the consideration of the suitability of the case for operation, and of its extent, if not the actual operative procedures themselves, should be the province of the laryngologist.

We are in the habit of dividing the pharynx, like Gaul, into three parts, naso-pharynx, oro-pharynx from the level of the palate to the level of the opening of the larynx, and larynge-pharynx from this level to the lower border of the cricoid where the pharynx becomes the oesophagus. This division is not merely academic, it has a special significance in the consideration of malignant disease. When we examine the statistics we find a very definite diversity in the sex-incidence of malignant disease of the three parts. As far as I know the tables prepared by Logan Turner of Edinburgh are the most instructive in this study. Shortly, we may summarize the matter thus: Malignant disease affects the oro-pharynx (tongue and fauces included) in the proportion of five males to one female, the larynge-pharynx, five females to one male, and the larynx five males to one female. We can, I think, understand, as far as the incidence of malignant disease can as yet be understood, the greater susceptibility of the male as regards the oro-pharynx and the larynx, but the reason for the greater preponderance of females in carcinoma of the larynge-pharynx is difficult to explain, though much ingenuity has been expended in searching for an explanation. Developmental tendencies, habits as to food, especially in the

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taking of hot drinks, differences in the method of breathing, all have their advocates.

Looking for a moment at the age incidence we find here, too, a difference in the sexes. The age is lower with females than with males and though this is more pronounced in the larynge-pharynx it is also sufficiently evident in other parts of the pharynx. I have seen at least three cases of cancer of the pharynx in women under 30 (in one the age was 23), but I have not met with a male affected under that age. Turner gives 45 as the average of females and 57 of males, with malignant disease of the larynge-pharynx. In laryngeal malignant disease, and especially in the intrinsic variety, the age incidence is decidedly higher than in pharyngeal.

Symptoms.—I shall not say much as to the symptoms of malignant disease of the throat. They vary with the site. Hoarseness, extending for more than a week or two, difficulty of swallowing, however slight, the more so if it is associated with loss of weight, pain on swallowing shooting, it may be, up into the ears, cough where no cause can be discovered in the chest, certainly demand a careful laryngeal examination. Don't be content with a diagnosis of sore throat, laryngitis, ear ache. The fixed idea is a curious phenomenon. I have known, we all have, a practitioner sailing merrily along with his diagnosis of laryngitis, even when the glands of the neck have become a hard mass, the weight has fallen from 14 to 8 stone, or their equivalent in pounds, and the case has gone beyond operation, even by the most optimistic, or if you will, foolhardy operator.

Examination.—This is where laryngologists come in, and from this point we are responsible for the case. It therefore behooves us to study the condition with the aid of all the methods and knowledge which, at the present day, are placed at our service. Examination with reflected light will naturally be our first line. If the disease is in the naso-pharynx, or in the lower pharynx or larynx, we shall use in addition the laryngeal mirror, the method now known as the indirect method. It has its limitations. By it, however, we may learn of the presence of a growth or of ulceration, of its position and of its naked eye characteristics, though, as a rule, not of its extent. We can, too, examine the condition of the cords, the presence or absence of fixation, and the position of the apparently fixed or paralysed cord, from which we may draw inferences as to the site of the suspected growth in the lower pharynx, be it understood, as well as in the larynx.

Direct Examination.—First a word as to malignant disease of the naso-pharynx. As we have seen this is the least common site, as far as the pharynx is concerned. Epistaxis, nasal obstruction, deafness at first in one ear (of the middle ear variety) with severe pain, are suggestive symptoms. In my experience there are not many patients in whom without or with local anæsthesia it is impossible to obtain a complete view of the naso-pharynx. There are several forms of electric nasopharyngoscopes. For myself I prefer Yankacurs Speculum, and, certainly in any suspected case of malignant disease of the naso-pharynx I should not consider the examination complete without its use. While in any part of the pharynx and larynx early recognition of malignant disease is all important, in no part does this so strongly apply as in regard to the naso-pharynx, where it very quickly passes beyond the range of suitability for operation.

In dealing with growths and ulceration in the pharynx proper and in the larynx we have at our disposal two methods of direct examination, the suspension method and the method by means of tubes.

The suspension method of examination is, in my opinion, of inestimable service, indeed I never consider the question of operation, or of any other form of treatment, till this procedure has been carried out. As a rule cocaine anæsthesia, preceded by an injection of morphia, omnopon, or some such preparation, is sufficient, but where this is not I do not hesitate to make use of a general anæsthetic. The disease can then be examined, with its normal relationships, its extent can be more accurately defined, and, a matter of great importance, we can learn in many cases by palpation with a cotton tip probe whether or not the growth and mucous membrane are still movable, or whether the disease has penetrated into the deeper structures. A portion of the growth can now be removed for histological examination. I am sure it must have been the experience of all laryngologists to attempt to remove a portion of a suspected growth by the indirect method and subsequently to find that what had been removed was only a portion of oedematous tissue in the neighborhood of the growth and not a portion of the growth itself.

The use of the suspension apparatus obviates this difficulty. Certainly by its aid operative procedures of this nature in the lower pharynx and larynx are rendered more exact and easy. Indeed it was the criticism of an American cousin,

when first he saw the method in use, that the worst of it is "Tis so easy, any fool can use it." I don't agree with that in its entirety. That it does make the examination more exact at times was demonstrated to me by the case of a woman who came to my clinic. She had complained of pain on swallowing for some time. She had been seen by two laryngologists of repute, who declared, after examination by the indirect method, that there was nothing wrong, and yet, with the aid of the suspension apparatus, there was disclosed in the larynge-pharynx, on the posterior wall, a growth about the size of a shilling, proved by histological examination to be malignant. It was afterwards removed by a lateral pharyngectomy. The method, of course, has its limitations. In a good subject, however, and in most subjects with a little manipulation, the larynx being pressed forward by a flat probe or spatula, a view of the pharynx is obtained down to the cricoid region, a common site for malignant disease. Then, too, in those subjects—and they are not a few—in whom an epiglottis retractor is required to obtain a view, sometimes even then an unsatisfactory view, of the larynx, of its anterior part at any rate, by the indirect method, the suspension method overcomes the difficulty. The anterior part of the larynx is admittedly the most difficult part to see. With the suspension apparatus in position and the epiglottis lifter carefully adjusted by pressure over the neck in front of the thyroid cartilage, the whole of the anterior part of the larynx can be brought into view. I prefer to use pressure with the fingers for this purpose rather than the mechanical device suggested by Killian and supplied with the apparatus. I show a sketch of the larynx prepared by a student of mine, of a case of early malignant disease of the left cord of which only an unsatisfactory view was obtained by the indirect method, but which as you will notice, became completely evident by this direct method.

The other method of direct examination is, as I have said, by means of the tubes. As I have already stated, my habit is to prefer the suspension apparatus in examination of the pharynx and larynx. Some throat surgeons however, possibly the majority, make use of the tubes by preference. I have been told that they have found the suspension method unsatisfactory and that only in a minority of cases have they been able to obtain a satisfactory view. That has not been the experience in my clinic. In using the tubes, both for the air and food passages, I prefer the left prone position with the head thrown back. When the

disease is below the level of the upper margin of the cricoid a longer tube than the tube-spatula, an oesophagoscope in fact, is used.

The next method of examination, and also in my opinion essential, is a removal of a portion of the growth for histological examination. I know it used to be said that in very early suspected disease of the larynx, of a cord for instance, this might be omitted. Working with the indirect method this advice was, no doubt, justifiable. At the present day, where one of the direct methods can be applied, I doubt if it is. At any rate in two instances where I have followed it, one occurring before the introduction of suspension laryngoscopy, the other since, the growth removed by thyrotomy turned out to be tubercular. In both my opinion as to the growth being malignant was fortified by that of another laryngologist. No doubt my experience is not unique. Not only in the larynx but in the pharynx too it is sometimes quite easy to mistake a tubercular nodule for a malignant. I have recently had under my care a case of primary tubercular growth in the lower pharynx in a man of 46.

Though examination by *x-rays* is not so valuable in conditions of the pharynx as in those of the oesophagus, there are some cases where a growth is situated in the cricoid region where this method can give important information. Ordinarily the screen is used while the patient standing in the erect position swallows a bismuth or barium meal. I have found, however, that a better view may be obtained if this proceeding is carried out with the patient lying down. The meal enters the oesophagus more slowly. A satisfactory plate can also sometimes be obtained. A radiologist used to this branch of his work can give us very great assistance. Thus a condition which on examination with the oesophagoscope appeared to be operable is found on radiography to be quite beyond the scope of operation.

One more examination is required in suspected malignant disease of the throat before we can consider the question of operation and of its extent. This is careful examination for the presence of involvement of the glands, and that this may be conducted systematically we must bear in mind the association of the lymphatic glands with the various parts of the upper food and air passages. Not only is it necessary to think of those glands which can be palpated in the neck, but evidence of the involvement of the glands in the mediastinum must be sought for in the shape of pressure on the bronchi or veins and on the recurrent nerves.

Treatment by operation.—What Semon did in the way of limitation of operative procedures for intrinsic carcinoma of the larynx, surgeons like Trotter are doing in regard to malignant disease of the pharynx and of the extrinsic portions of the larynx. The aim of the present day is to extirpate the malignant growth and yet to retain the continuity of the food and air passages. The application of this principle, while it does not entirely do away with the complete removal of the pharynx and larynx, of both or either, diminishes the proportion of cases where this may be necessary. Indeed those of us who undertake the treatment of these cases have felt compelled in some instances to resort to these desperate measures, not I am bound to say in my experience with any great success, unless it be in regard to laryngectomy. It is not my intention to say anything about thyrotomy. That operation in intrinsic disease of the larynx has fully justified itself, as the records of many operators on both sides of the Atlantic and elsewhere can show. The number of cases in which laryngectomy is indicated must be proportionately much smaller. On the one hand the disease must have extended beyond treatment by thyrotomy and on the other hand it must not have progressed beyond the confines of the larynx and the very upper part of the trachea. That is to say it must not have progressed beyond the confines of the larynx and the very upper part of the trachea. That is to say it must not have extended into the food passages and it must be possible to divide the trachea well below it and yet leave sufficient to bring forward to attach to the skin. In one of my cases this latter point caused me most anxiety and for some time afterwards. I feared that the trachea might break away from its moorings. The result, however, is most satisfactory. It is three and a half years since the operation and there is no recurrence. The man is very well indeed, and unlike the rule in these cases, is very cheerful, works regularly, has developed a good, indeed a very good, pharyngeal voice and actually smokes. He has what is said to be rare in Scotsmen, the saving sense of humour.

There is no particular difficulty about the operation of laryngectomy. For myself I don't do a preliminary trachentomy. If there is any doubt as to the suitability of the case for laryngectomy, or rather if there is a possibility that thyrotomy, with extensive removal inside the larynx, may be sufficient, the larynx should be opened and an examination of the interior made. In perform-

ing laryngectomy after severing the muscles attached to the thyroid cartilage, close to the cartilage, and dividing the isthmus of the thyroid gland, the larynx and trachea are fully exposed. A search is then made for glandular involvement and surgical procedures adopted accordingly. The trachea is then carefully separated from the oesophagus. Carefully is used advisedly, as it is quite possible to tear the posterior wall of the trachea or the wall of the oesophagus during the process. The trachea is then cut across, either from before backwards, or from behind forwards, as far as possible below the growth, and yet sufficiently high up to allow of the lower part being brought forward and sutured to the skin. Some paring away, however, may be done after the trachea has been firmly anchored. The anaesthesia is now, of course, conducted by way of the open trachea. This part must be carefully isolated with gauze from the operation area. The upper cut end of the trachea is turned upwards and the windpipe separated from the oesophagus and pharynx and from the hyoid. A tube is passed through the nose into the stomach and the gap in the pharynx closed with strong catgut. The divided muscles and the fascia are drawn together in the middle line and the skin incision sutured.

The removal of the pharynx in addition to the larynx does not add much to the difficulty of the operation, though it does to the severity and to the subsequent distress of the patient. After the trachea has been divided the oesophagus is separated behind, a clamp applied, and the tube divided below it. The lower end is then passed below the sternal part of the sterno-mastoid and through a buttonhole in the skin flap where it is sutured. The patient then breathes through the severed trachea and is fed by a tube through the severed oesophagus. Stated thus, it is easy to understand his distressful after history if he survives the operation, and later, if he lives for any length of time, which only a very small minority do. That has been my experience, though of course, as is well known to us all, some few cases are reported where the most extensive removals, *e.g.*, of larynx, pharynx, glands, thyroid gland, enlarged blood vessels, have been followed by the survival of the patient for several years. Still, when all is said, a complete transverse removal of larynx and pharynx is an operation of great severity, followed, in most cases, by death, either directly from the operation or after a few months from recurrence, and the condition of the patient, during the time he survives, is unenviable.

This brings me to a consideration of the alternatives to this wholesale removal and to the surgical procedures whose aim it is to remove the growth and yet retain, in some measure at any rate, the continuity of the food and air passages. In Great Britain, Trotter of London has been a pioneer in this matter. But of primary importance is early diagnosis, and it is up to us laryngologists (to use the forceful but inelegant Americanism which has been incorporated into the English language) to make use of all methods making for diagnostic precision. Then, too, a careful selection of cases improves the chances of success of the operation.

I do not intend to describe in detail the operative methods. These are adapted to growth in different parts of the pharynx. Tracheotomy is performed several days previously, or at the time of the major operation. The pharynx is packed, thus shutting off the upper opening of the larynx and also filling out the pharynx and making, as seemed to me, the determination of the extent of the growth, when approached by way of the operation incision, more easy. If it is done under direct vision, with the aid of the suspension apparatus, the packing can be done precisely, and at the same time one starts the operation with a definite mind's picture of the pharyngeal appearance. As Mr. Trotter points out, there are two distinct stages in the operation, the exposure of the growth and then its removal. Indeed in many cases there are three stages, where it is necessary to follow up the removal by some plastic procedure to restore the wall of the food passage and also by devising some means to safeguard the opening into the larynx if part of it has had to be sacrificed. The incision extends along the anterior border of the sterno-mastoid muscle practically from the tip of the mastoid to the clavicle. If the growth is in the lower part of the pharynx then the incision need not commence so high up and if it is in the upper part it need not go so far down. The dissection is carried out down to the constrictor muscles of the pharynx and to the wing of the thyroid, the muscles attached to this being divided. The sheath of the large vessels is then determined, and to minimise the risk of septic infection on passing along it and also to lessen the risk of subsequent serious and even fatal hæmorrhage from ulceration of the vessel walls, the vessels are shut off from the operation cavity by stitching the anterior border of the sterno-mastoid to the aponeurosis in front of the spine. If the growth is in the lower pharynx or in the wall of the larynx

the wing of the thyroid cartilage is now removed and a vertical incision is made through the constrictor muscles to expose the mucous membrane. If the growth involves the pharyngeal wall it may now be possible to outline it before opening the pharynx. A careful examination should be made, both of the extent of the growth and as to whether it is still confined to the mucous membrane or has passed beyond the cavity of the pharynx and invaded the adjacent structures. It is at this stage that disappointment so often arises. However detailed and careful the preliminary examination has been, it is in many cases impossible to determine the whole extent of the involvement, laterally, deeply, and in a downward direction. Just one example will show what I mean. A woman of fifty had a malignant growth in the lower pharynx. On examination and especially with the suspension apparatus it was seen to involve the right pyriform sinus and to extend towards the post cricoid region, but there was no interference with the movements of the cords. No involvement of glands or of structures outside the pharynx could be made out. By x-ray examination with a bismuth meal, its extent downwards appeared to be limited. This comparatively favourable view was supported by the general condition of the patient. She was in good health otherwise, and her body very well nourished. Yet when the pharynx was exposed in the way I have described, it was found that the growth had invaded the right lobe of the thyroid gland, had travelled down the anterior cesophageal wall, invading the posterior wall of the trachea, and there were enlarged glands passing downwards towards the mediastinum. Removal was out of the question.

But to return to the operation. The pharynx is now opened by a vertical incision passing through the uninvaded mucosa where this is possible. Again a careful examination is made. The larynx can be easily rotated to examine its posterior surface. Even at this stage the question of operation or not has again to be considered. Further surgical procedure is adapted to the exact conditions found, the rule being observed to cut wide of the disease (and this applies to the larynx as well as to the pharynx) at the same time taking special care not to make an accidental perforation of the posterior wall of the larynx or trachea when the position of the disease might make this a possibility. If there is glandular or other involvement the operation is extended accordingly. Then comes the examination of what remains. Two all-important questions call for answer. Has

it been possible to preserve the continuity of the food passage and has the removal of the portion of the larynx been of such limited extent that it is possible to safeguard its opening? If it has been necessary to remove the lower pharyngeal wall in its whole circumference, then the œsophagus must be anchored to the skin, though it may be possible later to restore the continuity of the food passage. If a sufficient and continuous portion of the wall remains the anterior flap of skin is turned in and attached to the cut edges. A rubber tube is now passed through the nose into the stomach. Later when the skin flap has become united with the pharyngeal wall it is separated from its original attachment and turned in to complete the restoration of the pharynx. This part of the operation is by no means easy and it is only with difficulty and with patience that the resulting fistula is overcome.

It is, however, in regard to the larynx that the chief difficulty arises, at any rate in my experience, and in several instances it has seemed to me that it would have been safer if I had performed a complete laryngectomy, as it was found impossible to prevent food from passing into the windpipe. It is in such cases that a careful selection is required. Trotter endeavours to overcome the difficulty by stitching up the larynx under the root of the tongue so that when the tongue arches in swallowing the upper opening is covered. The great value of maintaining the windpipe, for purposes of voice, however hoarse or raucous, gives this part of the problem supreme importance. Then, too, the complete removal of the larynx may make it impossible to restore the continuity of the pharynx where an extensive removal of its wall has been part of the operation.

The problem then, as can be seen, is a very difficult one. Indeed every case must be decided on its individual merits. The difficulties again do not end with the operation. The after treatment and the nursing demand great care and attention, overcoming, if possible, difficulties as

they arise. These cases make a great tax on our nursing staffs. In one of my cases the wound was healed and the patient dismissed from hospital under three weeks, but in most cases this period is extended it may be to months. The method, however, is, I am convinced, the method of the future. If the region of the tonsil pillars or root of the tongue is the part involved another incision is made joining the incision along the sternomastoid from the tip of the mastoid to the chin. The triangular flap thus made is turned downwards and forwards, the jaw is divided in front of the masseter muscles, and the two halves are forcibly retracted. A particularly good exposure of the tonsillar region is in this way obtained.

For growths involving the epiglottis a transhyoid incision is sometimes recommended. I have used it on one occasion and the exposure was good and the removal of the growth easy. At the same time the cases must be very few indeed where this incision can be preferred to the one already described.

Some exponents advise diathermy for some operable as well as inoperable cases. I have only used it for the latter. At first recommended only in the treatment of the primary growth, it is now used also, in many cases, for the glandular involvement, and those whose experience in its use is much greater than mine report some very gratifying results. It certainly seems to be likely to prove a valuable aid in the treatment of these distressful cases.

In the Scottish Universities, though not, I think, in all the teaching schools in the British Isles, and of those elsewhere I cannot speak, attendance on a course of laryngology is compulsory for students. We may therefore anticipate that these cases will be recognized at a much earlier stage and in this way reach the surgeon at a time when operation holds out increasing hopes of success. For after all, to end where we began, early diagnosis is the key which will solve the problem of malignant disease of the throat.

EXPERIENCES OF AN OTOLOGIST IN FRANCE, 1915-1919

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IN the following paper I propose to give an account of the ear, nose, and throat conditions which came under my care while on active service in France from 1915 to 1919. A fair number of these were seen while at 26 General Hospital, Etaples, some at 7 General Hospital, St. Omer, but the great majority were seen after my appointment as otologist to the Second Army in 1918.

The class of case met with resembled closely that of the out-patient clinics of peace time. Very few war injuries came under my observation. This is explained by the fact that in 1918 the actual battle zone was too far off, and the Ear Centre was not in the direct line of evacuation. The effects of mustard gas poisoning were not met with either, as during the summer and autumn of 1918 the movements of the troops were too active for the effective use of gas. During the winter 1917-18 as battalion medical officer I had many cases in my unit during the end of the fighting in Flanders in the Houthulst Forest and Passchendaele sectors, but at that time I had no means of examining the larynx. In this area gas lesions were met with in the form of intractable skin burns, and in the respiratory system in the form of loss of voice. At one time about a quarter of the regiment was affected in this way.

My notes of 1415 cases contain some very interesting material. A statistical analysis of them shows up the relative frequency of some conditions and the rarity of others as contrasted with figures from civil practice. In military work ear conditions by far outweighed nose and throat conditions both in frequency and importance. Thus, in my series there were 1209 pathological ear findings as compared with 775 pathological conditions of the nose, nasopharynx and throat, a ratio of 1 to 0.64. If one compares these figures with those taken from an average out-patient clinic, such as those of the Ear, Nose and Throat Department of the Royal Infirmary,

Edinburgh, one finds a marked difference. Thus, in the Royal Infirmary in three years there were 5382 ear affections as compared with 10627 nose, throat, and laryngeal cases, a ratio of 1 to 1.97. A large proportion of the 10627 is accounted for by tonsils and adenoids (3597), and in a civil clinic these are mostly children. Even deducting these tonsil and adenoid cases there are still 7030 nose and throat conditions, so that the proportion of the ear cases is still 1 to 1.3, which means that in the army the proportion of ear cases is almost exactly double what it is in civil practice.

TABLE OF COMPLAINTS AND DISEASES

COMPLAINTS

Deafness	558
Ear discharge	651
Pain in ear	259
Subjective noises	128
Vertigo	43
Nasal obstruction	103
Colds	53
Discharge	47
Headache	65
Bleeding	155
Sore throat	118
Hoarseness	25
Loss of voice	43
Cough	13

PATHOLOGICAL CONDITIONS

Wax	105
Ot. ext.: boil, etc.	176
Acute middle ear catarrh	41
Chronic middle ear catarrh	113
Otosclerosis	23
Ac. middle ear suppuration	74
Chronic middle ear suppuration	398
Mastoiditis	27
Labyrinthitis	3
Intracranial complic.	3
Results of otitis media	122
Nerve deafness, etc.	28
Gun deafness, etc.	26
Ear polypi	77
Purulent rhinitis	27

Hypertrophic rhinitis	86
Deviated septum	176
Nasal polypi	11
Acute antrum supp.	4
Chronic antrum supp.	5
Acute frontal sinusitis	13
Mixed sinusitis	2
Atrophic rhinitis	12
Foreign body in nose	4
Adenoids	183
Acute tonsillitis	31
Chronic tonsillitis	95
Pharyngitis	37
Laryngitis	52
Vocal nodule	4
Functional aphonia	15
Negative examination	47
Malingering	9

With regard to the symptoms a glance at the accompanying table will show that discharging ears were the commonest condition for which advice or treatment was sought, and this was followed closely by deafness. Pain, subjective noises, and vertigo were much less frequent. The most common nasal symptom was obstruction, and the most common throat symptom was acute or chronic sore throat. Of the pathological conditions found chronic middle ear suppuration heads the list. Next come otitis externa, results of otitis, chronic middle ear catarrh, and wax. It will be noticed that otitis externa, under which heading are grouped boil, diffuse inflammation of the meatus, eczema and impetigo, occupies a relatively high place. Thus, in the Royal Infirmary figures already quoted there were only 261 cases of otitis externa to 4053 middle ear conditions (1 to 15.5). In my series the corresponding figures are 176 to 805 (1 to 4.5).

In the earlier years of the war contagious skin diseases, such as impetigo, were rife owing to the absence of organized attempts to deal with the problem of vermin. In 1915 and 1916 cases of severe impetigo of the ear were very common. In the later years of the war, however, these were not seen. Furunculosis of the ear was fairly common, as were also boils on other parts of the body. The extensive use of tinned foods, bad water, and difficulty in keeping clean may perhaps account for them.

A large part of my work was medico-legal. Soldiers were sent down to the Centre for a report on their hearing. In my experience malingering pure and simple was rare. By the word malingering I mean a person with no lesion who deliberately simulates some disability. On the other hand most of the deaf patients whom I saw exaggerated somewhat their real deafness. To

determine the exact degree of deafness was not of capital importance, but one had to determine it within certain limits. It was necessary to know whether a man could hear well enough for front line duty, or if not, whether he was fit for military duty of any sort.

I do not propose to describe in detail the various tests employed. It will suffice to say that they can be divided into three classes: (1) tests of sincerity, (2) reflexes, (3) tests requiring cooperation. The latter were only satisfactory when the patient was sincere. They include tuning fork tests and quantitative hearing tests.

DEAFNESS AND FITNESS FOR MILITARY SERVICE

In the French army the minimum hearing requirements for armed service are whisper at 50 cm. or ordinary voice at 4 to 5 m. (15 ft.) For the auxiliary services a quarter of the above hearing distances are required. Anything less than that entitles to exemption or discharge. Cases with caries or polypus formation or cases with cholesteatoma or attic suppuration are exempted if they are not improved by treatment.

In the German army the minimum requirements for active service are a unilateral defect of not less than whisper at one metre. For the auxiliary services a hearing distance is required of whisper at one metre if bilateral, or if unilateral, hearing at less than one metre is accepted when the other ear is normal.

In the Italian army similarly the standard of hearing is whisper at one metre.

During the recent war the demand for men was so great that the standards of recruiting were considerably lowered. It was found by experience that men could make good soldiers even if they had some physical defect which would formerly have exempted them altogether. It may be taken as a good general rule that in the case of unilateral deafness the hearing should not be less than whisper at three feet, and ordinary voice at about ten feet in the deaf ear for front line work. If the deafness is bilateral whisper should be heard at six feet and voice at fifteen feet. For Class B, total deafness on one side may be allowed if the other ear is normal. In bilateral deafness ordinary voice should be heard at six feet.

With regard to the fitness of patients with chronic middle ear suppuration hard and fast rules cannot be laid down. Under such circumstances as obtained during the late war in France and Belgium, where medical attention and hos-

pital treatment were always available many men could be taken for service with old-standing middle ear suppuration without much risk. However, large numbers of men with chronic middle ear suppuration were sent on front line service who should have been either kept at home or on the lines of communication. Active service aggravated the condition and serious complications were liable to supervene. If these complications were immediately recognized the matter would not be of such great importance, but it is our experience that lateral sinus thrombosis, extradural abscess, labyrinthitis, brain abscess, etc. were not generally recognized until too late. Those soldiers who were unfortunate enough to have chronic middle ear suppuration with caries were subjected to risks which might have been avoided. It may be argued that these men were exposed to death by enemy action in any case, but such accidents are unavoidable from the nature of military operations, but deaths attributable to neglect of chronic diseases should not occur. The kind of case that is dangerous is that with granulations and polypi where drainage is insufficient. Cholesteatoma in the attic is particularly dangerous. Cases with a large perforation and little discharge are fit provided their hearing is up to the standard.

The disposal of chronic middle ear suppuration cases during the war was a great problem. The wastage from this cause alone was enormous. Numbers of soldiers running into thousands were constantly going from hospital to convalescent camp and back to hospital again, sometimes for months at a time and receiving little or no treatment and performing no useful work. Many were classed as P.B., but the numbers of P.B. men were so great that it was difficult to keep them usefully employed. It would have been much wiser to have discharged many and have put them to munition making, for which they were perfectly fit, or to have them resume their civil employment, where in all probability they would at least be self-supporting and not an additional burden on the public purse. A ruthless comb out of the fit men in the munition factories would probably have yielded large numbers of useful men to take their place.

It is a fact greatly to be regretted that Otolaryngology was not officially recognized as a speciality during the war in the British army. It was not till the later stages of the war that special centres for ear cases were created and put in charge of recognized otologists. This was done only after

great insistence by the various consultants to the armies, and even then the equipment and organization were very inadequate. Neurological and eye cases could be sent to special hospitals at the base or in England, where expert service could be obtained. Serious ear cases on the other hand were very often sent to some small country hospital, where they received no treatment by specialists, with the result that their healing was delayed indefinitely.*

It is to be hoped that if we are ever unfortunate enough to be again drawn into a conflict like the late war we may have an efficient organization for the treatment of ear cases, which could begin to function immediately. This is only possible if some representative body of specialists will insist on the proper recognition of the specialty by the army medical authorities, and work out a scheme by which otologists should be stationed in various easily accessible hospitals, so that any patient requiring special treatment could get it. Ear cases when sent to the base should always be sent to an otological centre so that the results of any previous treatment should not be spoiled through neglect.

At the Second Army Ear Centre we took into hospital for treatment all acute ear conditions, *e.g.*, boils, acute middle ear catarrh and suppuration, mastoiditis, etc., and those chronic cases which were likely to show rapid improvement. Aural polypi were removed and the ears treated with syringing and medicated drops. In some instances intratympanic syringing was used with beneficial results. Most of these men were returned to their units with the ears dry and the hearing improved. Others did not dry up entirely, but with few exceptions were improved enough to return to their units.

In the matter of operative treatment, it was felt that the radical mastoid operation should not be performed unless the indications were very strong, such as pain, or other signs of impending danger. The radical mastoid was very unsatisfactory in military practice as it was rarely possible for the operator to supervise treatment till its completion. This was possible only at the base or in England. We performed such operations therefore only in cases of urgency. Wertheim of Breslau (1) collected 100 radical mastoids operated on during the war by various surgeons.

* These remarks apply only to the R.A.M.C. and A.M.S., not to the C.A.M.C., which was, I believe, very well organized in respect to special treatment facilities.

He found that in 48 of them the ear was still discharging and there was no question of cure. In 51 the ear was practically totally deaf (whisper at less than $\frac{1}{4}$ m.) In 80 per cent. whisper was heard at not more than one metre. These results are not to be compared with those obtained in civil practice, where the operation is fairly satisfactory. In a series reported by J. S. Fraser and myself (2) 85 per cent. were dry. As regards hearing 68 per cent. were improved, 18 per cent. remained the same, and in 13 per cent. the hearing was diminished. In the series of Fraser and Garretson (3) 50 per cent. were perfectly dry and free from discharge, adding cases slightly moist but not discharging, 66 per cent. The hearing in the majority of cases was slightly improved but the hearing before operation was generally already extremely poor.

Again, even if a perfect cure results from the operation the duration of convalescence is so long that from the military point of view the time spent does not compensate for the possible slight increase in efficiency of the soldier. We were not so much concerned with the ultimate health of the patient as his immediate future, for it must be remembered that the primary function of the medical service in war time is to keep the ranks full.

In the French army, where there were large otological services, a considerable number of operations were done on selected cases with the idea of rendering men permanently fit in that respect and returning them to the line. These operations were mostly of the modified radical type of Heath or Bondy in cases of attic suppuration with good hearing. A cure was obtained in 50 to 70 days (4). Conditions in the French army were more favourable for this kind of treatment, as the patients could be kept under observation by the surgeon till the treatment was completed.

A healed radical mastoid is no bar to military service provided that the hearing is normal in the other ear. Fourteen old radical mastoids and two modified radicals were seen by me at the Centre. Their operations dated from 1 to 12 years previously. The average period was 4.7 years. Of these 16 cases 6 were clean and dry, two contained wax but were otherwise clean, while 8 contained pus and granulations. The hearing was noted in 7 cases. In one dry case whisper was heard at 9 feet, but in the rest ordinary voice was heard at less than two feet, and in the majority of these only at the ear. That is to say, in 6 out

of 7 the ear was functionally useless. In the army we would naturally come across those cases with the poorest results, so that these probably do not give a fair impression, and besides, the general conditions of active service with bombardments and other forms of annoyance would all tend to aggravate the existing deafness.

Among my cases of chronic otitis media there were 18 cases of attic suppuration with perforation of Shrapnell's membrane. Of these 3 had dried up, Headache or pain in the ear were noted in only 5. The hearing varied from ordinary voice (CV) 3 inches to 15 feet. The average distance was a little over $5\frac{1}{2}$ feet. These cases were all treated by conservative methods. Syringing followed by instillation of either H_2O_2 or alcohol was used in all cases, and in some lavage with an intratympanic cannula. Good results were obtained by these means. In one instance large masses of cholesteatoma were washed out, after which the ear dried up completely.

One case of attic suppuration is not included in the above numbers as the perforation was not in Shrapnell's membrane but in the posterior part of the drum membrane proper.

Pte. W. Admitted 3-10-18 with history of discharge from the right ear for a year. His ear had discharged some time before also. Had had a feeling of stiffness and weakness of the right side of the face for three months. Had pretty constant headache on the right side. Examination showed copious purulent discharge in the right ear with posterior perforation and polypus. Left drumhead atrophic. Air bubbled through the perforation on auto-inflation. There was some drooping of the right side of the mouth. Nothing to note in the nose or throat. Whisper was heard at 14 feet right, ditto left. The polypus was removed from the right ear, and after removal a probe could be passed up into the attic.

7-10-18. Still copious discharge of pus; caloric test R produced horizontal and rotatory nystagmus to L in 20 seconds; pneumatic test negative.

12-10-18. Pus more copious; hearing worse (whisper 11 feet); weakness of face more marked.

26-10-18. As there was no improvement in the amount of discharge or headache and the facial paresis was becoming more marked operation was decided on. Modified radical operation; cortex sclerosed; antrum contained pus and cholesteatoma. Aditus and antrum were opened up and the bridge was pared down very fine and

removed without disturbing the membrane or ossicles. Meatal flap cut and cavity packed.

3-11-18. Tube patent today; air can be blown through and fluid syringed through to throat.

18-11-18. Cavity almost dry now. Whisper heard at 14 feet.

22-11-18. Face much improved; ear nearly dry. Patient evacuated to base.

GUN AND CONCUSSION DEAFNESS

In this class are grouped firstly those who complained of deafness due to a definite explosion of shell, bomb, etc., and secondly those who were becoming gradually deaf from continued exposure to loud noises. Very large numbers of patients complained of deafness which they attributed to the noise of the guns. However, on examination they were generally found to be suffering from a very chronic middle ear suppuration. It is of course probable that some increase in deafness is likely to result when a patient with a large perforation of the drum is repeatedly exposed to heavy concussions as in firing heavy artillery. It was very common in gunners to get a history of previous otitis media which had dried up but had come back when on duty with the guns. It is reasonable to suppose that a cicatrix would be very liable to be ruptured by the shock of the firing of heavy guns, as the concussion wave from the discharge of most of the heavy howitzers and the long range guns is enough to blow out a candle 100 or more yards away.

Of my cases there were 26 in whom the deafness was wholly or partially due to gun fire or shell explosion. Of these 26 sixteen attributed their deafness to single shell commotion. The second group of 10 had been affected by continuous loud noises and were for the most part gunners. Six cases were probably psychic deafness. Two of these were apparently absolutely deaf, and two others almost totally deaf. The vestibular reactions were normal. It was very difficult to decide here whether we were dealing with malingering or hysteria. Such cases are very difficult to treat by suggestion on account of the difficulty of approach. The general opinion of those with extensive experience of such cases is that absolute deafness is generally functional. It is unlikely that a shock, which leaves the vestibule unaffected, is at the same time severe enough to cause total destruction of the cochlea and end-organs.

In most of the cases of the second group, that is, those exposed to continuous loud noises, there

was shortened bone conduction and a positive Rinne test. It must however be noted that the tuning fork results must be accepted with reserve, as it is natural for a person who has something to gain by appearing to be deaf to give answers which form a fairly typical picture of nerve deafness. However, four showed hæmatomas of the drum and two others showed some delay in the response to the caloric reaction on the affected side. Blumenthal (5) found in patients with healed gunshot wounds of the head that the hearing was affected in 50 per cent. Bone conduction was shortened in 91.8 per cent., but this shortening was only partly in proportion to the degree of deafness, and was found in 84 per cent. of cases with normal hearing.

With regard to the pathology of labyrinth commotion it has been shown experimentally by Prenant and Castex (6) in guinea pigs and rabbits that explosions caused dislocations of the cells of Corti, especially in the basal coil, hæmorrhages into the scala tympani, degeneration of the cells of the spiral ganglion, and ascending degeneration of the cochlear nerve. The vestibular organs were unaffected. J. S. Fraser and J. Fraser (7) have shown that in warfare injuries to the ear hæmorrhages take place in the middle ear, cochlea and internal meatus. In this connection I would like to bring up a point which bears on the mechanism of such injuries. While on duty in a small town in France, which received considerable attention from enemy aviators, I had ample opportunities for observing the effects of high explosives on buildings. It was a striking fact that when bombs had exploded in a street the window glass and even the shutters of the houses were burst *outwards*, except in those instances where an actual missile passed through the windows. Apparently there is a sudden wave of negative pressure following the explosion. It is reasonable to suppose that the effect of this negative pressure on the ear would be to cause a rupture of the smaller vessels.

With regard to the pathology of noise and occupational deafness it was shown many years ago experimentally by Wittmaack, Siebenmann, Yoshii, and others that prolonged exposure to loud noises of a constant pitch caused degeneration of the end-organs in certain parts of the cochlea corresponding to the pitch of the sound. Low pitched tones affected the apical coil, high-pitched tones the basal coil, and medium-pitched tones the middle coil. Rodger (8) showed that boiler-maker's deafness in the earlier stages showed a

defect only in that part of the tone scale which corresponded with the prevailing loud noises. Later the deafness spread up and down the scale. Wittmaack (9) in a subsequent paper found experimentally that the lesions caused by air-conducted sounds remained stationary and did not spread, but that the progressive deafness was due to vibrations conducted from the floor through the bones. This produced a degeneration in a part of the cochlea different from that affected by the air-conducted sounds.

I saw so few cases of rupture of the drum membrane that no conclusions could be drawn from them.

Among some of the more unusual ear conditions were three cases of latent purulent labyrinthitis. One of these had a large extradural abscess and lateral sinus thrombosis in addition, and has already been reported in a previous paper (10). There was also one other case of sinus thrombosis and one of otitic meningitis.

I also saw two cases of facial paresis and one of facial paralysis. One case of paresis involving the mouth was due to an acute mastoiditis with infection of the deeper tissues of the neck. After clearing out the mastoid cells and the abscess in the neck the paresis cleared up. The other paresis came on a week after a radical mastoid operation. The face became swollen and tender to touch after the patient had been out in a very cold wind. The condition passed off completely within a fortnight. One patient came in with complete facial paralysis on one side of two months' duration. No cause for it could be discovered though syphilis could not be positively excluded.

There was one case of Meniere's syndrome. A brigadier-general, aged 44, came 27-8-18 with a history of repeated attacks of vertigo. The first attack was mild and occurred in May, 1915. In 1917 the attacks became very severe. The last attack was on 19-8-18. It began at 11 p.m. and lasted until 2 a.m. The giddiness was so severe that the patient could not move nor even sit up, but had to lie upon the floor. The only two positions tolerable were either flat on his back or prone on his face. He vomited repeatedly on the slightest movement and had the sensation of the surrounding objects moving round. There was no headache. He is fairly deaf in the left ear. In 1916 he was greatly troubled with subjective noises in the left ear, but this is now becoming less troublesome.

Examination showed both ear drums norm[al]

and moving on inflation; nothing abnormal in the nose, pharynx, or nasopharynx. The hearing was three inches for conversational voice in the left ear with the noise box in the right ear; hearing normal in the right ear; Rinne positive R., negative L.; Weber not lateralised; bone conduction slightly increased; no spontaneous nystagmus. The patient reported that he had had a positive caloric test a short time previously and refused to have it repeated. He also refused to be rotated. The pointing test was normal on both sides. There was no tendency to fall on standing with the eyes closed and the feet close together. Reflexes were normal; blood pressure also normal according to Col. Miller. Capt. White reported that the eye showed small patches of choroiditis, such as might have been due to hæmorrhages. A specimen was taken for a Wassermann test but the patient was lost sight of.

One case of chronic middle ear suppuration had a positive pneumatic test or "fistula symptom." This was best brought out by closing the patient's ear and getting him to do a Valsalva inflation. No instruments were available at the time for doing a mastoid operation, so the case was treated on conservative lines pending the arrival of the instruments. In the meantime however the otitis media cleared up completely, but the pneumatic test remained positive. The patient was sent to the base.

Among the more interesting nasal conditions were found four cases of acute antrum suppuration, and five of chronic suppuration. Of the chronic cases one had a nasoantral polypus. Another somewhat unusual case of chronic antral suppuration with an acute exacerbation had very marked proptosis of the eye on the affected side with vision diminished to mere perception of fingers. After a radical antrum operation and removal of the middle turbinate the swelling receded and the vision came back to normal. ($\frac{6}{60}$).

Sapper B. Admitted to Eye Centre 29-8-18 with history of pain in left side of head for eight days. The left eye became swollen and closed two days later. He had also had some discharge from the nose. On admission there was considerable proptosis of the left eye with great oedema of the lids and conjunctivæ. Vision was only $\frac{6}{60}$. Patient was seen by me 30-8-18 with Capt. H. V. White, who reported that the proptosis was more marked and that there was more limitation of movement and some engorgement of the retinal veins. Could only count fingers. The second left upper bicuspid stump was very

tender. The left side of the nose showed thick pus in the middle meatus. The tongue was furred. Both the ear drums were normal. The tooth was extracted but no communication was found with the antrum. The left antrum was punctured and copious foul pus washed out.

31-8-18. Caldwell-Luc operation. The antrum was full of foul pus; lining membrane much thickened and polypoid, almost gelatinous in consistence; roof of antrum dehiscant; orbital contents felt through the opening. Mucous membrane completely removed and a large opening made into the inferior meatus of the nose. The middle turbinate was also removed and was followed by a small gush of pus.

2-9-18. Eye swelling gone down considerably, no proptosis now. At 1.25 p.m. the patient had an epileptic fit lasting about five minutes. He had another at 1.40 p.m. lasting about two minutes. The limbs of both sides were equally affected.

11-9-18. The eye movements are now perfectly free and the swelling localised to the cheek. The wound of the mouth is still discharging much pus. There is still a slight headache.

17-9-18. The washings from the nose are now pretty clean. There is some supraorbital pain and tenderness on the left side still. There is still pus in the middle meatus, which evidently comes from the frontal sinus. Vision now $\frac{6}{6}$. Patient was sent to the base, while the writer was on leave.

There were two cases of broken nose, one of hæmatoma of the septum, one of abscess of the septum, and two cases of anosmia for which no cause could be discovered. I also saw two patients with old healed antrum suppuration.

One patient came on account of middle ear catarrh with frequent blockage of the tube. Adenoids had been removed a good many years previously with very little benefit to the ear. A firm white band of scar tissue was seen joining the Eustachian cushion to the posterior pharyngeal wall. This could not be seen with the

mirror but only with a Yankauer speculum, by means of which a probe could be hooked round it. The adhesion was divided with scissors. The further progress of the patient is not known.

One rather unusual case of retropharyngeal abscess was met with. The abscess was seen and opened through the mouth, but it had also burrowed laterally and a few days later pointed behind the sternomastoid. When this was opened it was found that there was a large cavity behind the scalene muscles.

Pathological conditions of the larynx were very rare with the exception of acute and chronic laryngitis. One case of papilloma of the vocal cord was seen. One case had apparently a paralysis of the interarytenoid muscle. Several cases of functional aphonia were treated by suggestion with good results.

The most unsatisfactory phase of military work was that one saw patients for only a very short period and could only very rarely follow them up till their treatment was completed. There were many cases of great interest which passed out of one's sight and were lost altogether.

REFERENCES

1. WERTHEIM—*Arch. f. Ohrenheilk*, Bd. 102, 1918.
2. FRASER AND DICKIE—*Journ. of Laryngol.*, 1912.
3. FRASER AND GARRETSON—*Journ. of Laryngol.*, Oct. 1919.
4. BOURGEOIS AND SOURDILLE—Paris, 1917. Masson & Cie.
5. BLUMENTHAL—*Monateschr. f. Ohrenheilk*, 1917.
6. PRENANT AND CASTEX—*Rev. de Laryngologie*, Sept. 15, 1917.
7. FRASER AND FRASER—*Journ. of Laryngol.*, Nov. 1917.
8. RODGER—*Journ. of Laryngol.*, March, 1915.
9. WITTMACK—*Arch. f. Ohrenheilk*, Bd. 102, 1918.
10. DICKIE—*Journ. of Laryngol.*, April, 1918.

WHAT DOES PUBLIC HEALTH ADMINISTRATION EMBRACE?*

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THE unfortunate illness of Dr. Hastings, who had expected to deliver the address on Public Health on this occasion, is much to be regretted not only on account of the absence thus necessitated of one so universally esteemed, but also because of the need for entrusting the address to infinitely less experienced and less competent hands.

The subject which Dr. Hastings had chosen has been appropriated by me without leave or license, and in full consciousness of my inability to give it the thorough and effective consideration it would receive at his hands. The scope of the subject is so extensive that only certain features which are not commonly acknowledged to come within the embrace of public health administration can receive more than the most meagre reference.

Although the field of public health activity has been greatly extended within the last few decades, we may still feel that the matters which principally engaged the attention of sanitarians in earlier years remain fundamental factors. Man is capable of much adaptation, and we have it on excellent authority that he wants but little here below, but he will always require air, water and food. Most of the phases of all but the more recent public health work really cluster around the endeavour to secure these essentials in proper quantity and quality. Thus in connection with the air supply we must give attention not merely to measures for the suppression of dust, smoke and noxious effluvia and the ventilation of buildings, but also to such other things as the cleanliness and drainage of the soil, and the orientation, general planning, type of construction, plumbing, heating and artificial lighting of our buildings. Similarly, we can scarcely dissociate the water supply from problems of refuse and sewage disposal, while in respect of the food supply we must

give heed to all matters which may in any way impair its purity or nutritional value, at every stage of its production, transportation, marketing, and even its preparation and service to the ultimate consumer. The prosecution of such activities requires legal authority, laboratory investigation, engineering supervision, and a variety of other services, so that even the sanitary control of air, water and food is not so simple a matter as it is commonly supposed to be. And when we take into account the measures usually adopted in connection with the infectious diseases, which necessitate legal authority, laboratory study, police supervision, etc., and also consider the machinery required for the collection and compilation of vital statistics, while we have merely covered the public health field as it was cultivated until within comparatively recent years, it will be seen that a considerable variety of factors are concerned in its administration.

It thus becomes obvious that an intelligent appreciation of all that is involved in public health administration requires knowledge of a very wide range of subjects, including many which do not appear in the medical curriculum, and demands a more extensive knowledge of several of the basic subjects of the medical course than is required for ordinary medical practice. Specialization is therefore essential, and the personnel of well-organized health departments includes those whose chief training has been along other than medical lines.

In consequence of the work which has been done, principally along these lines, we are able to point to some very satisfactory results. For instance, the average duration of life in Great Britain is now fourteen years greater than it was so recently as 1850. A century and a half ago, 50 per cent. of the inhabitants of England died before reaching the age of 25, while 50 per cent. now attain the age of 54. A half a century ago the general death rate of England

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and Wales was 50 per cent. greater than it is today. These figures may be taken as typifying the proven possibilities of health work along the standard lines which have been indicated.

Again, it has long been recognized that certain faulty habits, certain forms of occupation, certain conditions of temperature, climate or atmosphere, and a variety of other factors, mostly impersonal, have been inimicable to the highest standard of health, and such things have naturally been the object of efforts at administrative control. But it is only of late years that particular attention has been directed to the prevention of ill health which is resultant upon the remediable defects of early life, such as diseased tonsils, adenoids, dental caries and ill-nutrition. This has led to a great enlargement of the earlier efforts in connection with the physical examination of school children, originally undertaken for the purpose of more effectively controlling the communicable diseases but now being aimed at the discovery and remedy of all defects which may prejudice full physical development. Out of this has grown an appreciation of the need for going back of the school age, even to antenatal life, and endeavouring to correct any abnormality of function or structure which may be discovered. This extension of public health work cannot be expected to effect such notable reductions in the general death rate as have followed the more generally applicable procedures, for obviously the whole public cannot be reached by such specialized effort until very large budgets become available and until there is a general willingness to accept such ministrations. But its importance must be obvious to all; its bearing is not merely upon the future health of children as shown by the remarkable experience of New Zealand, where the infant mortality rate, formerly about 120 per thousand births, has been reduced within a few decades to less than 50 per thousand births.

This form of work has brought forward the *public health nurse*, whose advent is perhaps the most notable event in the recent history of public health achievement. Her work has proved invaluable in many ways; perhaps more particularly in carrying instruction on the preservation of health into the homes of those who most need it. She is brought into contact with a large variety of social problems, and the co-ordination of her work with other phases of community welfare has become one of the most promising even if it is sometimes one of the most difficult problems of health administration.

An outgrowth of this development is the *health centre*—an institution which is designed not only to provide appropriate treatment for the defects found in those in necessitous circumstances, but also to facilitate the study of the social problems involved, and to further the necessary instruction of groups of individuals to whom the health nurse ministers. So, in addition to the infectious disease hospitals, which have long come under the health authority, and to the tuberculosis hospitals, which are a more recent acquisition, the health centres have now become a factor to be considered in health administration.

Having in this way given some attention to the younger members of the community, we must now listen to the cry of the elders. The *general death rate* has been much reduced almost everywhere, but this is because of improvements effected in the earlier years of life. In the age groups above age forty, the tendency on this continent is to a higher rather a lower mortality, and those of us who have passed that age are naturally apprehensive and wish consideration. Such organizations as the modest Live-a-little-longer Club and the more ambitious Life Extension Institute have aroused the expectation that health administration will soon embrace activities aimed at the prevention of the vascular degenerations and other conditions which account for the increasing mortality rate in the higher age groups, so there are possibilities of an enlargement of responsibility in this direction. Meantime, however, other interests have been pressed by various voluntary organizations which have been devoting effort to one or another feature of the apparently limitless field for those who are desirous of effecting social betterment. There are few of our social problems,—poverty, degeneracy, vice and crime—so deterrent to community and national progress, which are not intimately associated, either etiologically or sequentially, with ill health. Out of this realization there have developed some special activities (industrial hygiene, social hygiene, mental hygiene, etc.) which are gradually becoming absorbed into the general health programme and adding to the difficulty and complexity of administration.

In illustration of the extent of the present day conception of what constitutes investigation of public health problems, I may be permitted to refer to one or two of the vast number of studies now being made. We have amassed a large bulk of statistics which purport to show the influence of occupation upon health. These, however,

have come to us from a great variety of sources, not always untinctured by the personal bias of the observer, not always collected with the keen attention to analytical detail which is essential to really informing statistics, and not always representing the whole truth. While certain trades are classed as particularly unhealthy it may be largely because those engaged in these trades are singularly ill-adapted to them or because local conditions, often quite remediable, such as bad housing, defective nourishment, special encouragement to intemperance, play a part more or less considerable in the determination of the high morbidity and mortality rates. There is really great need for a much more comprehensive study of such occupations than has yet been undertaken.

Anthropometry.—Limited as our knowledge is in respect to the practical application of anthropometry to the possible and perhaps probable influence of any given occupation upon the health of any given individual, it is not unreasonable to suppose that with due consideration of racial characteristics and inherited physical race or family traits, anthropometric data may have a bearing upon organic defects which, properly interpreted, would be of great value in the selection of men and women for various kinds of work. And this thought recalls to mind the oft-repeated observation that certain localities furnish men and women of particularly fine physique, while other localities give antithetic results; an observation which was frequently confirmed by the experience of recruiting officers during the war. We have been attributing this in the main to the influence of environment and heredity, but the matter has been given only superficial consideration. Is this not a matter of sufficient importance to warrant elaborate and careful study? Then, too, it is a commonly held belief that certain racial admixtures produce offspring of better than average type. Should we not have definite knowledge of the possibilities of improving the human stock in this way? These lines of research are suggested merely to indicate a few of the many fields which lie open to investigation with fair promise of the discovery of much material which would be practically useful in the prosecution of public health work.

The Organization.—We have talked much lately of reconstruction. As a matter of fact we really mean construction. To my mind there is no more promising form of constructive work than that which aims at building up a virile and resourceful people.

It is less than a hundred years since British armies were engaged in a very serious enterprise in the Crimea. You will remember that for some time the outlook was not very encouraging. In the first year's campaign the disease death rate was frightful, and the wounded died in great numbers.

Then a certain lady was commissioned to go out to the scene of action to minister to the wounded. She did more. She made conditions in the hospitals sanitary. The death rate amongst the wounded was reduced from 25 per cent. to 2 per cent. This was, I think, the first instance in which the principles of sanitation were really applied to a military expedition. I wonder how many can at this moment recall to mind the name of the British general to whom the capture of the Redan is credited. I wonder how many cannot recall the name of "The Lady of the Lamp." Lord Raglan did more for Britons than to give them a name for a particular style of overcoat, but Florence Nightingale has a firmer place in our affections than generals more distinguished than the conqueror of Malakoff and the Redan. Her work was purely constructive; it is such work which is of the greatest benefit to mankind.

We spent large sums of money on the medical services of our armies, and the saving in lives and in the health of our men was enormous. Very likely there was some wastage of money, but that is surely better than wastage of men. The need for haste at that time made full consideration of the various procedures impossible; we may proceed with greater deliberation and greater attention to economy in connection with the preventive measures which are applicable to peace times. But the longer the deliberation, the greater will be our loss in life and in efficiency. We have reached a time in our National career which is undoubtedly most critical. If we take the flood tide we may be led on to fortune. It will surely be disastrous to wait for the ebb, which would inevitably carry us out to the ocean of oblivion. The future of Canada lies in our hands. Never before did so much responsibility rest on the individual Canadian. It is the plain duty of each one of us to give his very best effort towards making Canada truly great. What is done now and in the immediate future will have a tremendous influence in determining the whole after history of our dear land. Let us see to it that our Canadian people are not hampered by the inefficiency which ill health so commonly engenders.

Attention should be given to the conservation of health for the sake of the individual. It is a matter of concern to you and to me, to your families and to mine. Attention should be given to it for the sake of the community. Many a town has failed to progress because of the handicap imposed by ill health upon its inhabitants. But most of all should attention be given to it for the sake of the nation. As Patrick Henry said: "I have no way of judging the future but by the past; no lamp to guide my feet but the lamp of experience." From the history of the past we may judge what our history may be. Nation after nation has risen, excelled, declined in consonance with the physical and moral health of its people. Burkart states it very concisely: "Sanitary, civic and moral decadence was the worm at the root of every discredited and submerged civilization of the past." All too often wars of conquest have taken soldiers of victorious armies into countries where they acquired infection and whence they returned to spread amongst their own people pestilence which has ultimately caused their downfall. Egypt, Greece, Rome thus came in turn under the dominion of malaria and the plague, and to these conditions primarily the decline of these great nations is to be traced. And, according to Vaughan, it has been repeatedly noted that "in the presence of widespread contagion mankind in the mass tends to revert to the barbarous

state." The historian Niebuhr wrote that almost all epochs of moral degradation are connected with great epidemics. Writer after writer has expressed similar views. Gasquet, an abbot president of the English Benedictines, in his history of the black death observes: "The immediate effect on the people was religious paralysis. Instead of turning men to God, the scourge turned them to despair, and this not only in England, but in all parts of Europe. Writers of every nation describe the same dissoluteness of manners consequent upon the epidemic."

Disease, dissoluteness, vice have sapped the vitality of the great peoples of the past, and have led to their ultimate downfall. "Where there is no vision the people perish." We must appreciate the handicap under which we will labour if we do not advance in the matter of health conservation at least as rapidly as the nations with which we must compete. Our success in the struggle for a place among the great peoples of the world depends upon the possession of that acumen and resourcefulness which can only be attained by those who are in the most vigorous bodily and mental health. Let us then have clear vision, and give attentive heed to those things which are fundamental in securing for the people of Canada every opportunity for the fullest development of physical activity, mental vigour and moral strength.

Alvarenga Prize.—The College of Physicians of Philadelphia announces that the next award of the Alvarenga prize, being the income for one year of the bequest of the late Senor Alvarenga, and amounting to about three hundred dollars, will be made on July 14, 1922, provided that an essay deemed by the committee of award to be worthy of the prize shall have been offered.

Essays intended for competition may be upon any subject in medicine, but cannot have been

published. They must be typewritten, and must be received by the Secretary of the College on or before May 1, 1922.

The Alvarenga prize for 1921 has been awarded to Dr. John W. Churchman, New York City, for his essay entitled: "Selective Bacteriostasis of Gentian Violet."

For further particulars apply to John H. Girvin, Secretary, 19 South 22nd Street, Philadelphia, Pa., U.S.A.

THE RELATION OF GENERAL MEDICINE TO MENTAL MEDICINE*

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THESE are strange uncertain times. We look about us at a world in flux. Unrest, distrust, and discontent are rampant. We seem none too sure of what we want and are disturbed. Doubtless we are passing through one of the great transition periods that have marked the world's history heretofore, but, bearing in mind that it is not in his goals, but in his transitions that man is great, we may, perhaps, be somewhat comforted and believe that these uncertainties do but constitute a physiological epoch.

Nor has the profession of medicine been immune to the disturbances mentioned. We, too, feel this discontent, we see in ourselves peculiar contradictions—a constant reaching towards the new and radical, albeit with more than a passing glance at old traditions and customs. The old perfections of the earth still hold a place in our hearts. And strange to say, some of the things that we would fain believe glitter like new gold, are found on close examination to be but sound old metal reburnished. In the past decade, medicine came its nearest to being an exact science. Exact in the sense that we were taught and expected to find in each sick individual a specific cause and a specific ear-mark in the form of diseased structure. Medicine demands facts based on things seen, felt, heard. The individual patient was, as it were, gone over with a fine-toothed comb, our desire being to demonstrate some bacterium, some change in blood, secretion or tissue that would explain completely that patient's distress. The methods of precision have been worked hard, and had we not grown to depend too much upon them, all would yet be well. But the seers of medicine cry out that in our mad rush for scientific data, we have forgotten that there is

an art in medicine, that there is in it an intensely human factor that microscopes, colorimeters, etc., can never touch. One sees unmistakable signs of some discontent with the results of "laboratory medicine." We must grant that the laboratory has done much, but we know that it can never be all of medicine. You may ask what all this has to do with mental medicine, and I answer that I believe it is in this heretofore unfortunately isolated division of medicine more than in any other division, that the whole individual patient is being considered. Up-to-date psychiatry is making full use of the data of scientific medicine, but it has not forgotten that body and mind are inseparable and that disorders in one almost invariably set up reverberations in the other. It is an appeal for the consideration of this fact that I wish to make. The fair flower of medicine at this moment is surrounded by a variety of noxious weeds. Our would-be rivals, representing at best half-truths, make use, unconsciously often enough, of that keen understanding of the whole individual that should rightly be the most blessed attribute of medical art. The "Masters of Effrontery" have stolen and continued to steal a considerable portion of our most valuable possessions. Cults that still the fear of the sick by absolute denial of the existence of disease, or by direct promise of cure, do seem to supply something that many patients must have. Medicine seems to have lost sight of the sick man while busying itself with running down diseased gall-bladders, hearts or what not. Need we say that medicine must regain her own?

Let us look closely at the relationship of general medicine to mental medicine. The latter finds itself today almost an exiled specialty and this is not as it should be.

It is said that specialization is unquestionably essential for the rapid advance of knowledge in any new direction, but there is danger of a specialty

*Read at the Annual Meeting, Canadian Medical Association, Halifax, July 5-9, 1921.

being split off permanently by centrifugal action from the sphere in which it originated. This is apt to leave the specialty an isolated body revolving in a narrow orbit around its own subject, from which it ultimately ceases to draw much light or heat. For when the specialty gets very far removed from greater medicine, no matter how bright its original flame, it rapidly cools to the loss no doubt of both medicine and specialty. In the present relationship between general medicine and mental medicine, general medicine has no doubt been the greater loser. For while psychiatry, and by this I mean the treatment of mental symptoms whenever, wherever and in whatsoever degree they occur, is making use of practically all that general medicine has to offer, general medicine has woefully neglected the investigation and treatment of the mental elements in disease. It has failed, generally speaking, to realize that "Mind is the most intimate and personal of our possessions," that it "constitutes an organic structural part of our being." If it requires healing, if it has a definite relation to body, then can we deny that the physician must take it into account? We have been taught the embryology, anatomy and pathology of organs and tissues, but we have heard next to nothing on that of ideas and feelings. Three hundred years ago Burton, it is true, wrote his celebrated "Anatomy of Melancholy," and I crave your indulgence when I quote, for there is no more striking passage in that work than this: "For that which is but a flea biting to one causeth insufferable torment to another, and that which one by his singular moderation and well composed carriage can happily overcome a second is no whit able to sustain but upon every small occasion of misconceived abuse, injury, grief, disgrace, loss, cross or humor, yields so far to emotion that his complexion is altered, his digestion hindered, his sleep gone, his spirits obscured, his heart heavy and his hypochondries mis-affected; wind, crudity on a sudden overtake him and he himself is overcome with melancholy."

The classical conception of disease as set forth in text books is entirely based on a materialistic pathology. Altered function, in other words, symptoms, receive a physical, a bio-chemical or no explanation at all, treatment is confined to chemical reagents and drugs. And can we expect anything else when medical students receive practically no instruction in the detection and treatment of the mental elements in disease? They hear the advice to treat the patient and not the disease but they pay little attention to this

since they are not told how it is to be done. Most of them, slowly, perhaps painfully and almost certainly unconsciously, discover a hint of it for themselves as they pass on through their professional lives. One looks in vain through text books on medicine and diagnosis for anything suggesting that a great field in the investigation of each individual patient lies beyond the scope of laboratory method. I looked through six standard books on diagnosis and found that on an average they devoted half a page to the discussion of mental factors in disease. Students come to their final examination with little notion of personality or the tremendous part it plays in the practise of medicine. Students certainly, and the majority of practitioners I fear, approach their patients determined to find "one specific and definite thing as a cause for a most complex condition."

In internal medicine intensive study is directed toward the individual organ or system. It is frequently necessary to pay attention to the way in which the organs are linked together by the central nervous system or by the glands regulating the bio-chemistry of the body, but no higher integration is attempted. The actual individual is seldom reconstructed for the purposes of the internist; much less the surgeon. Personality is a category that he does not use. So far as the study of personal factors is omitted, the study of the function of the individual organs is incomplete. Campbell, whose words these are, has shown well the part instinctive reactions, emotions and personal factors play in the genesis of some heart disorders. War-time experience brought this home to many. Many gastro-intestinal cases arise on a similar background and the myriads of so-called psycho-neurotics going from physician to physician, demonstrate the supremely important position that psychic elements occupy in the genesis of symptoms of disease. We may see in these, if we but look, the devastating effects, both physical and mental, of maladjustments of mind to surroundings. There are minds not readily effecting that rapport with circumstances and environment that alone makes life normal, yes perhaps even possible.

This neglect of consideration for mental factors is in part the result of lack of training, in part due to lack of guidance by the recognized leaders of medicine, and in no small part, doubtless, due to indolence, impatience and hurry. The mention of psychic factors is so likely to bring down on one expressions of disapproval and irritation from one's brother practitioners, that strongly opposed views

and radical attitudes are engendered. Those recognizing the psychic factors are almost forced to be extreme because of the necessity of defending their stand against those who ridicule the idea that certain mental and emotional attitudes towards life can ever interfere with health. We have seen as the result of this the gradual drifting apart of general and mental medicine. The ties have grown more and more feeble until they are all but broken. General medicine spurns mental medicine and mental medicine has no doubt become seclusive as the result. What we urgently need is a home-coming not as a prodigal but as of a child, who through former misunderstandings, gradually withdrew and lost contact with its parent.

In days to come mental medicine's great contribution to medicine generally will be recognized as the longitudinal section method of surveying the patient instead of the cross-section method—the survey of the whole individual, the mental and nervous as well as the obviously physical. We must know that contrary to a frequently heard dictum, all men are not created equal. Daily experience makes it plain that men differ greatly in their mental, moral and physical attributes, and yet we, in treating a sick man, have seen no reason to inquire into and allow for inherent instinctive tendencies, emotional disorders and volitional defects. Aside from the increased confidence and comfort that complete investigation gives to the physician, there is the strong practical value to be considered. A careful, even if not too prolonged, searching of family and past history may reveal constitutional traits and environmental mal-adaptations that can conceivably, and may actually, modify or initiate present complaints or symptoms. The physician or surgeon brought face to face with an odd group of indefinite complaints, gains valuable insight into the case when on inquiry he discovers that the patient's life is shot through with evidences of abnormal sensitiveness and emotional instability. He will not lightly embark on radical procedures in treatment without further probing and without satisfying himself on the whole question of "What is this individual trying to do?" Has he actual solid pathology that will account for all of his complaints? Has he no solid pathology at all or, as most frequently happens, has he a moiety of structural and functional change with a large cloud of abnormal mental reactions surrounding it?

So much then for the general appeal for a more

thorough and searching consideration of the mental factors in disease.

We may refer for a few moments to yet another aspect of the question, and that is the presence of definite mental symptoms in cases of somatic disease. The occurrence of delirium in acute infections need not detain us. Everyone meets cases of this kind. But just in this connection we may mention an important type of mental disturbance which seems, as time goes on and facts accumulate, to be definitely and closely related to infection. I refer to the psychotic episodes of the puerperium. In the psychopathic hospital we have a very fair opportunity to observe such cases. There has not been a single puerperal case committed to a provincial hospital in Manitoba since the Psychopathic Hospital opened. We have noted, in every case seen by us, such signs of infection as fever, purulent discharge or leucocytosis. In looking back over the history of medicine we find that as the technique of midwifery has improved and sepsis grown less frequent, the acute mental disturbances have also grown less frequent. These are facts that point their own moral.

Few physicians recognize the fact that pernicious anæmia may be characterized or indeed ushered in by a mental upset. In one year four such cases have come to our notice and not all of them had the spinal cord signs that we are accustomed to think of as the contribution of the nervous system to the symptomatology of the disease. Delusions of persecution and ideas of influence and reference are the outstanding mental features of such cases, and they apparently rise and fall with the well-known remissions of the disease.

Epidemic encephalitis has contributed a very fair number of cases, some of them decidedly atypical, the true nature of the condition only becoming apparent after careful investigation or prolonged observation.

There seems just now to be danger of the endocrine glands being considered guilty too often, but I am convinced that we regularly miss the significance of disorders of these organs in many obscure mental conditions. During the past year I published in the Journal the report of a case of myxœdema that for a time was incorrectly diagnosed dementia præcox. A more recent case showed with her psychosis evidences of pituitary and thyroid disorder. All symptoms disappeared under appropriate treatment, only to recur when through carelessness the treatment was neglected. The symptoms again disappeared with the

recommencement of treatment. We know enough of the functions of the endocrine glands to be assured of the fact that they work together rather than separately and that they are closely connected with our emotional lives. In fact, one feels at times that they take part in vicious circles, pernicious activity being engendered by abnormal emotional demands and this same dysfunction acting toward keeping up or aggravating these same genetic conditions. Future investigation in this field holds much promise.

A few moments ago I spoke of the patient's personality as something to be seriously considered. Will you bear with me for a moment while I remind you that the physician's own personality is also an important factor? Scholastic attainment and technical proficiency do not make a complete physician. We too often see the dismal failure that comes when these are felt to be the only requisites for practice. The truly great physician is, as I think Dr. Rudolf has said, "he who, consciously or unconsciously, holds within himself and utilizes that gift of healing, that mystic personality that inspires faith in a sick man, who as he lies a crumpled wreck maybe, longs for the kindling spark of happiness, a ray of hope to light

his darkness." A cheerful heart doeth good like medicine, applies to doctor as well as patient.

As servants and medical advisors of the public, it seems then our duty to study carefully all the facts of both individual and disease, and to base our opinion on these facts unbiased by the habit training of a specialty or the conservatism of tradition. Not only must every psychiatrist be a real physician, but in very truth, he who would be a physician must be something of a psychiatrist. We may indeed believe that the towers of El Dorado, though distant, gleam brightly for those who with inexhaustible hope and inflexible resolution, base their faith on the art as well as the science of medicine.

And when we say art, we remember that all art (including that of medicine) is long and life is short and ultimate complete success seems very far off. And thus, doubtful of our strength to travel so far, we talk a little about the aim of all art, which like life itself is inspiring, difficult and often obscured by mists. It is not in the clear logic of a triumphant conclusion, it is not alone in the unveiling of one of those heartless secrets which are called the laws of nature. It is not less great—but only more difficult.

Use of Drugs in Neurology and Psychiatry—

Of the various symptoms which demand attention from the neurologist and the psychiatrist, C. MacFie Campbell, Boston (*Jour. A.M.A.*, October 15, 1921) says the most common are pain and distress, sleeplessness, agitation and excitement. These are the symptoms for which the physician has recourse to drugs, while the complex, underlying disorders are recognized to be beyond the reach of such simple methods of treatment. As for the treatment of pain and distress and sleeplessness, the danger of a purely symptomatic treatment is well known. They are merely indicators of the underlying disturbance, and it is the business of the physician not to confine himself to the warning sign, but to penetrate to the underlying disorder. Merely to remove the disconcerting symptoms involves the double danger of neglecting the fundamental trouble, and of developing an ignoble dependence on the drug. But symp-

toms deserve some attention on their own account, and pain is the one which is the most insistent. For conditions of mental distress with agitation, barbitol in comparatively small doses is a very useful drug. Paraldehyde is the drug which gives the nearest approach to a normal sleep, but owing to its disagreeable odor the coal-tar derivatives have been much preferred, and of the series barbitol is the most uniformly satisfactory. If in psychiatry the use of drugs is somewhat limited, it is largely because in these complex disorders the chief weight in the treatment must be laid on the personal relationship between physician and patient, on the organization of the nursing personnel, and on the atmosphere of the hospital with its occupational and recreational elements. It is in virtue of the presence of these factors that treatment in hospitals is, as a rule, to be recommended in preference to treatment of the patient at home.

THE CHLORINATION OF SMALL WATER SUPPLIES*

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PURIFICATION of water becomes necessary when the only available supply is polluted and in a dangerous condition. In selecting the method for any special case, it always depends upon the character and the amount of offending substances to be removed; upon the degree of purification required; upon the length of time the purification is to be carried on; upon the size of the available supply; upon the direct purpose for the purification and the ultimate end to be attained; upon the natural chemical contents of the water; and lastly, which is very often the most important, the available financial resources at our disposal for such a purpose.

The chemical disinfection of a water by chlorination, it must be admitted, is more or less only a temporary means at our disposal to overcome the dangers to health arising from a drinking water supply which has become polluted by sewage, thereby carrying the germs of disease. I have no intentions of advocating this method in preference to the slow sand bed filtration method that has most efficiently proved its worth. But when it has to be considered from the above-mentioned standpoints, and especially from the financial one, then disinfection by chlorination becomes of very great assistance in combatting the spread of most water-borne diseases (especially typhoid fever), as was illustrated a few years past in the epidemic of this disease which occurred in Montreal.

It is not my intention to enter into a discussion of the disinfection of large water supplies such as those in large cities, but only that of small water supplies as one finds in connection with institutions, factories, farms, and even that furnished to houses. In disinfecting small water supplies, as just mentioned, it is always found to be more difficult to regulate the flow of the required

amount of chloride of lime solution than it would be when millions of gallons of water are treated every twenty-four hours, as takes place in large municipal supplies. There is also considerable difficulty in preparing small quantities of the chloride solution. The cost of installing a plant for treating a large municipal water supply and the employment of the necessary skilled labor to attend to it is often less comparatively than when we are called upon to plan and install disinfecting plants for small water supplies; very often with a smaller purse or smaller financial allowance to use; then it becomes a more difficult question to solve. For example, I may cite one out of several cases where this difficulty has arisen, namely, the case of the Protestant Hospital for the Insane, Verdun, Quebec. In trying to protect the patients and the staff in this hospital, the management requested me to examine the water supplied for use in that institution. This was done in December, 1917. The samples of water, taken from the supply to the pumps, contained colon and paratyphoid organisms. As the government allowance towards the upkeep of the hospital is found insufficient, it was impossible to install a filtration plant; yet the water had to be rendered non-dangerous to health, without conferring on the water any odor or taste which might induce some of the patients to refuse to drink it.

This institute, through an agreement with the City of Montreal, draws its water supply from the nine-foot concrete conduit which brings the water for the use of the citizens from the Lachine Rapids of the St. Lawrence river. This conduit passes just back of the hospital grounds and the institute receives its supply by an eight-inch pipe by gravity to the basement of the pumping station. The water being used at this time was the untreated St. Lawrence river water, which is none too safe at any time.

After the board of management received the report on the bacteriological condition of the

*Read before the Public Health Section, Canadian Medical Association July 7, 1921

water, they immediately decided to install a plant for the chemical disinfection of their water supply, as their financial resources would not permit them to erect a filtration plant as recommended. The one which has been installed has been in constant use ever since. It consists of two small concrete tanks measuring inside 3 x 3 x 3 feet, or of a capacity of 27 cubic feet. The mixing tank is placed on a level with the top of the chloride solution tank and is connected with it by a two-inch galvanized iron pipe placed six inches above the bottom of the chloride solution tank so that the sludge will not be disturbed by the solution flowing out from the bottom. A sludge pipe leads away outside to carry away the sludge after discharging the solution; this pipe is a three-inch one and is provided with a valve.

In order to lessen the cost of this plant and facilitate the more easily the regulation of the flow of the chloride solution I invented a special drip nozzle or valve which does away with the discharge box usually employed in such plants. This nozzle allows the amount of solution to be accurately regulated.

From this valve the flow of the chloride solution is received into a funnel-shaped receiver. Also a stream of water is constantly discharged into this same funnel in order to keep up the water seal, thereby keeping out the air and preventing the pump from becoming air-bound.

The capacity of this plant is sufficient to chlorinate the water supplied to this institution for four or five days. At the same time, there has never been any complaints of either odor or taste being detected from the water, as the amount of disinfectant added does not go above 0.75 parts of available chlorine per million parts of water.

Since this plant was installed the results have been most excellent, as no cases of typhoid fever have developed amongst the inmates.

From time to time the water has been examined by me bacteriologically, to ascertain if the results are the best; and I shall cite some of the bacterial findings made on several occasions.

In October, 1917, the water contained thirty-four organisms per cubic centimeter of water and the colon-typhoid group of organisms was found to be present.

Again, in December of the same year, another examination of the water was made and which yielded 138 colonies per cubic centimeter of water and the colon-typhoid group was still present.

After chlorination of the water was commenced, a very marked improvement was noticed to take

place in it, as shown by the examination made in January, 1921. At this time, samples were taken direct from the supply pipe to the pump, before the dose of chloride solution was introduced into it, and gave on examination 17 colonies of bacteria per cubic centimeter of water with the colon-typhoid group present. But very shortly after the water received the treatment it showed only two organisms per cubic centimeter of water; while the colon-typhoid group was entirely absent. The more impressive do these results become when one considers that the time of exposure is very short.

From the above facts, we may conclude that this method of treating infected water is safe and at the same time renders an originally infected water harmless if cared for by a conscientious person.

When we consider the original source of this water supply, it is evident that liability of pollution is present at all times, as the St. Lawrence river receives the sewage from the various towns and cities which it passes on its way down from the lakes.

A very efficient emergency system using chloride of lime as the disinfectant may be installed where immediate action may be required in an institution or on a farm, with very little financial outlay. This consists of a mixing and of a solution tank, by making use of two stout vinegar barrels with their interiors painted with some good mineral paint or with asphaltum paint to prevent the too rapid action of the chloride on the wood. After such treatment the barrels will last for at least two years and possibly more. The piping should be of galvanized iron. If a valve as already mentioned be used the dosing can be easily regulated and the quantity of the disinfectant solution added according to the quantity of water to be disinfected. It is always very advisable to have a definite quantity of water in the mixing tank, say 40 gallons for instance, and to this add 2.5 lbs of chloride of lime. This solution should yield 0.1 parts of available chlorine per million parts of water.

Lastly, the disinfection of wells by chloride of lime should be attempted when the water in the well is shown to have received polluting material. It is not a wise proceeding to fill a condemned well in and dig a new one in the same vicinity, as the polluted water is forced out into the surrounding ground water, which may thus become polluted. This would likely be drawn upon in the supply to the new well. If the well is known to be polluted,

it should be disinfected by the generous use of chloride of lime and after 24 hours the water should be completely pumped out. The source of the pollution should be sought and the passage way which was followed by it traced, if possible, and removed or disinfected, after this the well should be treated as already mentioned.

The best method of carrying this out is by pouring into it a solution of the chloride. This solution of chloride should be added to the well in the proportion of five parts of available chlorine per million parts of water or one pound of the

chloride of lime to every 332.6 cubic feet of water, or 25,000 gallons.

On several occasions, chlorine gas in liquid form has been used in my experience, but owing to the more destructive action of the gas on the various metal connections and fittings, it has been invariably found necessary to discontinue its employment. While it may be more satisfactory from the fact that it is more easily handled and that we do not have the sludge difficulty to contend with, disinfection by the chloride of lime method and by the rapid sand filtration method at present have the preference.

THE TREATMENT OF ACUTE PELVIC INFLAMMATION IN THE FEMALE*

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THE term "acute pelvic inflammation" is used to describe a group of cases that cannot be properly designated by any more definite name; a group in which all, or most of the pelvic structures are more or less affected. Thus it might not be correct to speak of acute gonorrhœal endo-cervicitis as acute pelvic inflammation, whereas an acute gonorrhœal salpingitis might quite accurately be so described, since the uterus, ovaries, peritoneum and cellular tissues with their lymphatics and blood vessels might all to a greater or less extent be involved.

From the standpoint of treatment, the most important preliminary consideration is a classification based on the various ætiological factors which may give rise to pelvic inflammation. Thus we may have:

1. Infection following full term labour, accidental miscarriage or abortion.
2. Infection associated with some traumatism to the pelvic tissues, such as surgical procedures, or attempts to produce abortion.
3. Infection secondary to new growths, such as sloughing fibroid, or carcinoma.

4. Infection by specific micro-organisms, such as the gonococcus.

5. Infection from an extra-pelvic cause, such as appendicitis, or diverticulitis.

It is worthy of note that all the above ætiological factors, except the relatively few in group 3, are or should be entirely preventible, and it is consequently axiomatic that the best treatment of pelvic inflammation is prophylactic.

It may further be laid down as a basic principle that the treatment of every form of *acute* pelvic inflammation is essentially medical, and entirely expectant, and that the aim should be to so assist and strengthen the defensive forces of the body that they may overcome the infection, localize the inflammation, and eventually cause the absorption of the products of tissue reaction.

Rest in bed, frequent hot vaginal douches, ice to the lower abdomen, proper attention to nutrition and to elimination, with a judicious use of antitoxins and vaccines, are general measures which by themselves will permit of the cure of the majority of these cases.

Pathologically, pelvic inflammation may affect chiefly the uterus, the pelvic cellular tissues, the pelvic peritoneum, or the appendages, but since in every case each of these tissues is involved to a

*Read at the annual meeting of the Ontario Medical Association, Niagara Falls, June 3, 1921

greater or less extent it is more convenient to discuss treatment according to the ætiological factors concerned.

(1) *Infection following full-term labour, or accidental miscarriage or abortion.*

This group may be infective or septicæmic from the beginning, especially when following instrumental delivery with extensive laceration of the cervical zone, but probably the majority of these cases are sapræmic in origin, the symptoms depending on absorption of toxins from decomposing placental debris or blood clot.

Referring to each, it is important to note that the symptoms have followed the expulsion of all or of most of the uterine contents, and that as a consequence the cervix is dilated or easily dilatable. Under these circumstances, when threatening symptoms arise, the first essential is to determine that the uterine cavity is free from placental remains, decomposing blood clot, or retained pus, as may be seen for instance in acute retroflexions.

It is important to remember that sapræmia or absorption fever is rarely a distinct entity, but rather a condition of balance between the invading micro-organisms and their toxins on the one hand; and the protective forces of the body including the leucocytic zone on the other. Slight injury to the latter, without complete removal of the former, may easily permit a mild sapræmia to develop into a severe septicæmia.

The operation of clearing out the uterus is therefore not one to be lightly or carelessly undertaken. It requires considerable attention as to detail, and unless it can be done thoroughly is much better not done at all.

The patient should be prepared as for an aseptic operation, the vagina repeatedly flushed until absolutely clean, and a culture made from the cervical discharge. If the cervix is patulous the ungloved finger is the best instrument for determining the condition of the uterine cavity, for recognizing small pieces of adherent placenta, and for removing the same.

In certain cases where the placental remains are more adherent than usual, small polypus forceps introduced with the finger as a guide will be useful, or occasionally a loop curette may be of assistance. In no case should a sharp curette be used, and the term "curettage" should not be applied to this operation. In the class of case now under discussion, if the cervix is not dilated sufficiently to admit the finger, it is quite permissible to gently dilate it to the required extent.

When the examiner is satisfied that the uterine wall is everywhere smooth and free from adherent debris, the uterus should be thoroughly irrigated with a mild antiseptic, the cervix being meanwhile maintained widely open. The uterine cavity and cervix should then be lightly packed with iodoform gauze, both for its slight antiseptic action, but more especially for its effect in stimulating uterine contraction and thus shutting off lymphatic absorption. For the same purpose a preliminary dose of pituitrin should be given, after which ergot and quinine should be administered. The packing should be removed after twelve hours and a hot vaginal douche given. It is also our custom to give a preliminary dose of "stock mixed infection vaccine" at the time of the operation. This may later be repeated or modified, depending on the course of the infection, and upon the laboratory report of the cervical culture.

If now the symptoms rapidly subside, the case may be set down as having been one largely of sapræmia, and an attitude of watchful waiting will be all that is necessary.

If on the other hand the condition is progressive, it is evident that it is one of septicæmic infection, and further interference with the uterine cavity is useless. From this time on the treatment is similar to that of primary septic infection, and will be discussed later.

2. *Infection associated with traumatism to the pelvic tissues.*

This group readily falls into two divisions, viz:

- (a) following surgical operations,
- (b) following attempts to produce abortion.

The first division requires little comment at present, since the operator knows exactly what was done, and hence is in a position to treat symptoms as they arise. Relief of tension by removal of sutures, hot irrigations and other general measures will of course be indicated until the further course of the condition becomes plain.

With regard to the prophylaxis of infection following surgical operations on the pelvic organs, stress should be laid on the inadvisability of doing reparative work until a considerable time has elapsed after parturition or miscarriage. We have learned much of recent years as to the ability of bacteria to lay for months dormant in the tissues, only to be stirred into vigorous activity by the traumatism of an operation, and the most severe infections with which I have had to cope have been in cases where operation was undertaken at too early a period after childbirth.

The second division often presents a considerable number of difficulties. In the first place, it is usually impossible to secure an accurate history of what was done. Secondly, the infection often precedes the uterine evacuation, and consequently the cervix is usually hard and unyielding. Thirdly, the infection may have been introduced into the pelvic cellular tissues, or even into the pelvic peritoneum directly by punctured wounds from gum elastic catheters, hair pins, or other implements, and consequently the uterine cavity and its contents may not be infected in the slightest degree. Under these later circumstances, to dilate a rigid and infected cervical canal, to introduce instruments for the purpose of clearing out the uterus—since dilatation to admit the finger can rarely be secured, and thus add additional traumatism and infection to that already present—would appear to be very bad treatment. Of course it is evident that all gradations between such a hypothetical case and one in which the catheter has entered the uterus without parametric damage, causing sufficient disturbance to the contents to bring about uterine contraction, and hence some degree of cervical dilatation, will occur, and consequently each case must be treated on its merits. Arguments as to the relative advantages of active and conservative measures in cases of septic abortion have been very prolonged, but at the present time the consensus of opinion appears to very definitely favour a policy of non-interference, unless there are definite indications to the contrary, of which perhaps the only really important one is severe hæmorrhage. The correctness of this attitude is well substantiated by the results of the intensive study which has been made by Hillis (1) of the cases of septic abortion admitted to the Cook County Hospital in Chicago.

3. *Infection secondary to new growths, such as sloughing fibroid, or carcinoma.*

This group is rarely responsible for acute inflammation, although suggestive symptoms may occur due to sapræmic absorption from a sloughing intrauterine fibroid. The treatment is that of the causative condition.

Under appropriate treatment, the acute pelvic inflammation following any of the above conditions may rapidly subside. If however the symptoms persist, or tend to become aggravated, indicating that the inflammatory process is extending, it will usually be found that this extension is taking place in either of two directions, depending on whether the infective process is located chiefly

in the pelvic cellular tissue, or chiefly in the pelvic peritoneum. In either case the treatment should be along the general lines already laid down, until some definite indication for operative interference presents itself. The extent of the inflammatory mass which may form in pelvic cellulitis, and the degree of fixation of the uterus and other pelvic structures which may occur, is surprising, but not nearly so surprising as the absolute absorption of the same which may occur under expectant treatment. A careful watch should be maintained for bulging and softening in either of the fornices or in the pouch of Douglas, and if abscess formation is suspected its presence may definitely be shown by the careful use of a small aspirating needle. If present it should be opened through a vaginal incision behind or to the side of the cervix as may be indicated. After the vaginal wall is incised approach to the abscess may safely be made by a slender pair of forceps introduced closed, and withdrawn open, or if preferred the finger may be introduced through the vaginal opening and used as a guide for a pair of sharp pointed scissors, which are advanced closed, keeping close to the cervix, then opened to dilate a tract which the finger may follow. If the abscess is in the broad ligament the peritoneum should not be opened, while if it is in the pouch of Douglas care should be taken not to open or disturb the overlying layer of protective adhesions, and in either case the cavity should be drained by a self-retaining rubber tube. It should not be irrigated, and the tube should be retained in place, or possibly changed for a tube of smaller size, until the cavity is almost obliterated.

Certain cases of broad ligament suppuration will not present in the vaginal fornix, but will become evident as a tender swelling in the groin. These are best reached by an extra-peritoneal dissection over the inner half of Poupart's ligament.

Finally: what is to be done for those cases of frank pelvic peritonitis resulting from any of the above ætiological factors, where there is no attempt on the part of nature to localize the inflammation, but where on the contrary the peritonitis is definitely spreading? The fact that most of these cases are suffering from a generalized septicæmia or pyæmia, of which the peritonitis is only a part is sufficient reason for expecting a high death rate whatever the treatment. One feels however, where the peritonitis is the most striking feature as evidenced by local pain, rigidity, vomiting and distension, that occasionally we can save a patient by supra-pubic pelvic drainage. Fowler's

position and the Murphy drip. In the acute cases now under discussion I have not seen any greater benefits accrue from more extensive operations, such as hysterectomy, than from drainage alone, and the immediate mortality is certainly higher.

Cases of spreading thrombosis usually arising in connection with pelvic cellulitis are rather part of a subacute condition than acute. Attempts have been made to ligate the vein—especially the ovarian—above the thrombosed area, and to remove the affected part. One is not overly enthusiastic about the results thus secured.

A discussion of the treatment of generalized septicæmia and pyæmia is not part of this symposium, and it may suffice to say that the anti-toxins have disappointed us, the vaccines are too slow, and that possibly the future may demonstrate the value of the intravenous injection of antiseptics such as eusol, or of the transfusion of blood from immunized persons.

4. *Infection by specific micro-organisms.*

Under this head we may at once dismiss syphilis and tuberculosis as not being the cause of acute pelvic inflammation. On the other hand gonococcus invasion of the Fallopian tubes and contiguous structures is probably one of the commonest causes of this condition. The inflammation may be largely confined to the Fallopian tube by sealing of the fimbriated end producing pyosalpinx, may involve the ovary by contiguity, may cause tubo-ovarian abscess, or may extend to the pelvic peritoneum, causing extensive peritoneal reaction. In certain cases the infection passes through the tube rapidly and precipitates a spreading peritonitis, without any definite pus collection occurring in either the tube or ovary. In any case the peritonitis is remarkable for its adhesive character, a large amount of fluid exudate being rare, and when the abdomen is opened the usual appearance is of distended loops of bowel, intensely congested, and glued together by a croupous exudate. I am of the opinion that surgical intervention is distinctly contra-indicated in every case of acute pelvic inflammation, whether tubal, tubo-ovarian or peritonic, in which the gonococcus is the ætiological factor. If peritonitis is not present it certainly will result from attempts to remove an affected tube or ovary during the acute stage, and if it is present and spreading, it

will not be benefitted by an attack on the appendages, or by any form of drainage. It is of course evident that these remarks apply definitely to the acute stage only. When this has subsided the gonococcus rapidly becomes inert either through death of the organism, or through the development of protective mechanisms on the part of the body, and then it is equally true that surgical interference may be imperatively indicated, and it is surprising with what safety and with what absence of reaction a pelvic mass consisting of tubes, ovaries, and uterus may be extirpated, or a bilateral salpingo-oophorectomy performed. In the acute stage the only question is one of diagnosis. It must be remembered that one who has gonorrhœa may become pregnant, or think that she is, and attempt to produce an abortion. In this case the ætiology of the pelvic inflammation may be obscure, but the case should be treated conservatively until the diagnosis can be made. The only condition in which operation should be considered is that where there is a reasonable possibility that appendicitis is the cause of the pelvic inflammation, because of course the presence of gonococci in the urethra or cervix does not eliminate the possibility of appendicitis.

5. *Infection from an extra pelvic cause, such as appendicitis, or diverticulitis.*

Since diagnosis is not the subject of this contribution, I will merely point out that no common problem requires more judgment in its elucidation in a certain proportion of cases than the differentiation between acute appendicitis and acute oophoro-salpingitis, and in perhaps no other class is the successful outcome more dependent on the accuracy of the diagnosis, and on the carrying out of the indicated treatment, operative on the one hand, and conservative on the other.

The same remarks apply with somewhat less force to diverticulitis of the sigmoid, but the symptoms in this condition are rarely as acute, and an accurate history and careful roentgenological examination will usually permit of the proper diagnosis and of the indicated treatment being carried out.

REFERENCE—

HILLIS—"The Treatment of Abortion." Surgery, Gynecology and Obstetrics, Vol XXXI December, 1910, p 605

THE X-RAY DIAGNOSIS OF GASTRIC AND DUODENAL ULCER*

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IN the brief time allotted for the presentation of this important phase of the diagnosis of Gastric and Duodenal Ulcer it will be possible only to outline the method employed, to indicate its value as a diagnostic agent and to show a few lantern slides which will illustrate the pathology I shall describe.

In the first place it should be noted that, contrary to the title of this part of the symposium, there is no such thing as "x-ray diagnosis" of this or of any other pathological condition. The term is a misnomer. This is a method of examination based on the use of an instrument of precision, the x-ray tube, in conjunction with a sensitive photographic plate, or a fluorescent screen. The interpretation of x-ray findings on plate or screen in terms of pathology requires more skill, judgment and experience on the part of the physician than probably any other diagnostic procedure, not even excepting for instance the use of the microscope or the stethoscope. It should not be inferred from this that the x-ray method does not make errors. These mistakes however are nearly always of technique, or at least of interpretation, and are the result of lack of experience. It is often the case that when the surgical findings have been different from the x-ray findings a subsequent careful review of the plates will show the unrecognized pathology corresponding to the lesion which the surgeon has demonstrated. I should like therefore to urge the careful and prolonged examination of the plates, due deference being paid to the experience of the roentgenologist in gastro-intestinal interpretation.

Statistics as to the value of the x-ray examination of the stomach might be quoted at length: Carman in 1916 at the Mayo Clinic found in a large series of cases followed to operation, or autopsy, definite x-ray findings in

93% of gastric carcinomata,
83% of gastric ulcers,
60% of duodenal ulcers.

To quote further from Carman:

"From our own statistics we can say that nine-tenths of the ulcers of the stomach gave distinct roentgenologic indications of gastric disease, and in an overwhelming majority of these the roentgen signs were pathognomonic or strongly presumptive of ulcer."

Lewis Gregory Cole of New York in a further large series of gastric cases reports that operative findings on the stomach checked up with x-ray findings gave 96.6 per cent. correct as to pathology. Under these conditions the routine x-ray examination of the digestive tract in all patients with gastric symptoms, is therefore not only justifiable but necessary.

TECHNIQUE

The fundamental principle of the x-ray method as applied to the gastro-intestinal tract is the detection of alterations, permanent or transitory, in the normal contour of the digestive tube. These alterations of contour take the form of additions to, or subtractions from the normal shadow of the gastric or intestinal lumen as seen on the plate or fluoroscopic screen. The patient, properly prepared, with the gastro-intestinal tract empty, and divested of all unnecessary clothing, is first placed in front of the vertical fluoroscope behind the sensitive screen and in a darkened room. He is then given from two to six ounces of chemically pure barium sulphate thoroughly stirred either in water or in any other suitable suspension medium. The passage of this opaque material through the oesophagus is carefully watched, special attention being paid to any apparent narrowing or irregularity of its lumen. The stomach as it fills is similarly studied.

By means then of inspection of the illuminated screen and by palpation with the gloved hand,

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FIG. 1.—Large gastric ulcer.

the barium-filled stomach is thoroughly examined. Peristalsis is studied, and exact information is obtained as to the flexibility of the gastric walls, irregularities or abnormalities of outline, the presence of palpable tumour masses, of painful points on pressure, the effects of varying positions of the patient and of palpation, and finally the passage of the opaque gastric contents through the pylorus. The condition of the pylorus as to patency or obstruction is then determined and finally a careful study of the filling and exact out-



FIG. 2.—Small penetrating gastric ulcer at A. Deep incisura at B.

line of the distended duodenum is made, this being assisted by massage of the stomach contents through the pylorus.

Immediately following the fluoroscopic examination a number of serial plates varying from two to ten or more are made, some in the prone posture and others in the erect. Guided also by the information gained during the preliminary screen examination plates may be made in the oblique or lateral positions. The patient is examined again in about five hours to determine the emptying time of the stomach, the possible presence of pyloric obstruction and the position of the head of the advancing column of barium in the gastro-intestinal tract. A further examination is made in twenty-four hours, at which time the opportunity is taken of again examining the stomach and further plates are made if desired.

This briefly describes the writer's usual routine in gastro-intestinal x-ray examinations, but it is often considerably varied to suit the indications or requirements of the particular case being studied.

GASTRIC ULCER

Let us now turn to a consideration of the pathology of gastric ulcer. The lesion is a more or less circular area, varying in size from a split pea to two inches in diameter, situated usually near the pylorus, and nearly always involving the lesser curvature or the posterior wall. It is characterized by a loss of tissue involving first the mucosa only and later the deeper layers. The inflammatory reaction results in the production of scar tissue and induration with ultimate deformity of the gastric wall. The demonstration of this deformity is the fundamental principle on which the diagnosis of ulcer depends.

Minute inspection of the stomach profile on plate or screen will show the slightest break in its regular contour. A small bud-like projection from the main barium shadow, constantly seen, and usually on the lesser curvature, represents the actual ulcer crater. This niche is pathognomonic of penetrating gastric ulcer. If actual perforation of the stomach wall has occurred the x-ray picture is characteristic. The accessory pocket is demonstrated as a sac or pouch, varying in size from a quarter of an inch to an inch or more, outside the stomach proper. This pouch may retain its contents after the stomach is empty and its shadow is usually connected with that of the stomach by a narrow neck or isthmus.

In addition to the direct demonstration of the

the stomach wall, there are other more or less indirect signs.

The *incisura* is a fixed and usually deep indentation of the greater curvature opposite an ulcer. Its production is believed to be due to the irritation of the ulcer causing a spasm of the circular muscle fibres in that plane. A true *incisura* must be distinguished from other transient depressions such as that due to the edge of the costal arch and from peristalsis. Peristalsis is easily distinguished by appearing as a moving wave. Those due to reflex spasm usually disappear following massage or the administration of atropine



FIG. 3.—Perforating gastric ulcer at A.
Duodenal ulcer at A—B.

to physiological effect, and this test should always be applied when irregularities appear which cannot be definitely diagnosed as being due to organic causes.

The *organic hour-glass stomach* may appear in the absence of an accessory pocket and must be distinguished from the spasmodic hour-glass condition which can usually be relaxed by the administration of belladonna.

A *pressure tender spot* definitely localized on the lesser curvature, especially if occurring opposite an *incisura*, is of considerable value. If a tender point occurs with an *incisura* it is fair proof of an ulcer even if Haudek's niche is not visible.

Lessened mobility from induration of the gastric wall, at the site of an ulcer, is an area of rigidity over which there is no evidence of peristaltic



FIG. 4.—Gastric ulcer with Accessory Pocket and organic hour-glass constriction. At operation this was proven non-malignant

waves. There is often seen an irregular filling defect over such an area. As stated a moment ago, if a definite niche, which was described so characteristically by Haudek, is seen on the lesser curvature and if opposite this on the greater curvature we see a deep, narrow, fixed indentation, actual ulcer, from its invasion and deformity of



FIG. 5.—Very small duodenal ulcer.

the diagnosis of ulcer is certain. The other signs described taken singly may be of slight value; taken together and their value weighed carefully by an experienced observer, especially when associated with the clinical data, the diagnosis can usually be made positively. Degeneration of an ulcer and the presence of malignancy should be suspected in all cases where the ulcer crater is large but, as is well known, the final diagnosis of malignancy rests with the pathologist.

DUODENAL ULCER

Pathologically there is no difference between duodenal and gastric ulcers, except that the latter are larger, are more prone to the production of

4. A residue after six hours due to partial obstruction of the pylorus from contraction of the scar of a duodenal ulcer.

The value of these indirect signs, however, is not to be compared with that of visualizing on the screen or on serial plates a fixed and constant irregularity of the duodenal bulb corresponding to the location of an ulcer. The first portion of the duodenum, in which ninety-five per cent. of all ulcers occur, is a constant entity, and the appearance on the plate or screen of a perfectly normal bulb or "cap," at it is often called, rules out the presence of ulcer. The shape of the duo-



FIG. 6.—Duodenal ulcer.

scar tissue, are more likely to produce adhesions and in many cases degenerate into carcinomata.

For some time after the study of ulcer was begun an effort was made to establish the diagnosis, by means of the *x*-ray, on certain indirect signs such as gastric hypermotility and rapid emptying, or delay of the barium in the duodenum. Some of these indirect signs to which different writers have drawn attention, and on which attempts to base a diagnosis of duodenal ulcer have been made, might be mentioned and explained.

1. The accessory pocket of perforating ulcer corresponds to the same sign in gastric ulcer but is rarely seen in the duodenum.

2. Gastric hyperperistalsis and hypermotility with rapid emptying due to the irritation of an ulcer.

3. Pressure tender point over the ulcer as localized on the screen.



FIG. 7.—Large duodenal ulcer showing crater.

denum as seen by *x*-ray is characteristic and any ulcer which is more than a simple erosion of the mucous membrane will cause a deformity of this smooth outline. A deformity of the duodenum may be produced by adhesions or by spasm from reflex causes, such as cholecystitis or appendicitis, but these filling defects are not constant in outline and in the cases due to spasm may be eliminated by the administration of belladonna. I believe that with sufficient care and persistence the outline of any duodenal ulcer of surgical size can be demonstrated on the screen or on serial plates; and it has been my good fortune in several cases to have been able to demonstrate lesions of this character in the duodenum which at operation could scarcely be felt by the examining finger of the surgeon.

PROGNOSIS AND DIAGNOSIS IN TUBERCULOSIS AS
AIDED BY SEROLOGY*

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NEXT in importance to the diagnosis in pulmonary tuberculosis follows prognosis as a close second. Once the case is definitely diagnosed tuberculous, we ask what to do and for how long? If the infiltration is recent and active, we take strict measures by sanatorium regime to bring the disease to a quiescent state as surely and with as little delay as possible. If not so recent or active, and if constitutional symptoms are not marked, we say, perhaps, that the patient has already acquired some immunity and possibly the strictest measures may not be advisable.

If for instance he has already had six months or a year at sanatorium, he should have learned, and learned well, how to live. If his disease has reached the stage say of quiescence or apparent arrest, and if home conditions permit him to live in a fairly hygienic manner, perhaps he may safely remain at home. Possibly also he can work.

Or again, even on first diagnosis, the disease although definite may be of very slight extent with constitutional symptoms exceptionally mild. Is it ever permissible here to allow the patient to remain at home under certain restrictions and careful supervision? Have we any means of foretelling his clinical progress by gauging his present biological resistance to tubercle? Have we anything to add to the series of clinical observations we have used for some years, namely, response of temperature, pulse and focal activity to rest, etc.? We believe we have additional assistance in prognosis in the results of the examination of the blood for the inhibitive reaction. These results can be better interpreted, and are of greater value, as repeated tests are made, and when taken into consideration with repeated clinical observations, the tuberculo-complement fixation and the skin reaction.

In 1911, while at Muskoka Sanatorium, I wrote on "Difficulties in Prognosis" (1) detailing the usual series of clinical observations mentioned above, and saying "that we could save valuable time to patients if we knew better how to prognose." I then observed that "Caulfeild (2) has given us frequent assistance in prognosis by his investigation and interpretation of the biological states in tuberculous patients" and I anticipated that "the resistance remains to be further studied by research biological work." I am now in a position to report upon the results of this serological work in one hundred cases, and to set them alongside the actual clinical conditions. Seventy-three of these cases were in private or consultation practice and twenty-seven of them in the D.P.H. Chest Clinic at the Western Hospital. The bloods were drawn by myself and the serological work done under Dr. Caulfeild's supervision at the Connaught Anti-toxin Laboratories, Research Division, University of Toronto.

The inhibitive reaction is a serological test used to estimate the amount or degree of inhibitin in the blood. Inhibitin is the name applied to certain bodies or qualities found in the blood of tuberculous patients, who, as I shall show later, are resisting their disease well, that is from a biological standpoint. "Owing to possible changes in the biological classification in the course of a case the prognostic value is necessarily limited to a period of time, and these tests must be repeated in following the case and to anticipate any clinical change." (1). It must also be accepted that these reactions have "reference to some tuberculous antibody only, and a patient can conceivably have a marked resistance to the tubercle bacillus and still be dying from some complication." (6).

The inhibitive reaction was noted by Caulfeild in 1911 while working in serology at the Gravenhurst Sanatoria. In an endeavour to obtain some

*Read before the Ontario Laennec Society at the Kingston Meeting, October 22, 1920.

explanation for the lack of correlation between the results obtained with the tuberculo-complement fixation and the clinical cases, he developed a protocol which seemed to be basically different from the detail and type of protocol as used for the true tuberculo-complement fixation test. This technique he eventually named the inhibitive reaction. In this test the greater the degree of hæmolysis the greater the degree of the inhibitive reaction, a reaction which is the direct opposite to that obtained with the tuberculo-complement fixation test. (The term inhibitive was adopted because certain non-specific factors were apparently inhibited by the action of the specific tuberculous serum in the particular antigen used in the test.) Those cases giving a marked degree of hæmolysis, that is a strong inhibitive reaction, so frequently showed favourable progress that this correlation was a very striking feature. (I recall the discussions very well as I was then on the clinical side of the same institutions.) In 1911 (2) he published a monograph on this and the tuberculo-complement fixation, and since then the latter test has been taken up and tried out by many laboratory workers in America while the former test has been left for the originator and his co-workers to develop.

In regard to the tuberculo-complement fixation, Watkins and Boynton (6) introduce their comprehensive and lucid paper with these words: "Much water has passed under the bridge since Caulfeild's article on this subject in 1911, but the stream has not increased in clarity as fast as it has grown in volume." Whereas on the one hand we feel this to be true of the fixation reaction, which has been done in all our cases together with the inhibitive, we find, on the other hand, that the stream of our inhibitive results has increased in clarity as it has grown in volume. Again where Pritchard and Roderick (7) say "the complement fixation reaction was used as an aid in diagnosis and not as a control in treatment" in their series, they very well state our attitude, yet in contrast, we use the inhibitive reaction for prognosis and as a control for treatment primarily, and as an aid in diagnosis secondarily.

The inhibitive reaction obtains in three degrees, namely, marked, moderate and slight, or in easier phraseology, first, second and third class. These correspond to the laboratory abbreviations which Caulfeild has been using for ten years, viz., I^1 , I^2 , and I^3 . There may also be an indifferent or negative inhibitive, which makes

a fourth possible result, although the difference between slight and indifferent is comparatively insignificant in adults and we usually reckon them, for practical purposes, as the same.

In cases of definite clinical tuberculosis the reaction may be marked, moderate or slight. When the reaction is markedly inhibitive (first class) it is found that the patient is progressing very favourably against his disease; when moderately inhibitive (second class) he is progressing favourably, but to a less degree; when slight or indifferent (third class or negative) progress against tubercle is usually nil, and frequently the patient is failing.

Now to state what we believe takes place in an individual from the time he is a clinical normal, through a period when he is reacting to tubercle, to the time again when he may be free from the disease and say cured, the course is as follows: The reaction is primarily negative or third class, then second class inhibitive, later possibly first class, and here the reaction will remain as I^2 or I^1 , until the infection fades out, and is no longer a factor. Then the reaction is again that of the normal, namely, third class or negative.

It so happens in clinical tuberculosis that the reaction most frequent is the third class inhibitive, suggesting, according to our interpretation, little or no progress against the disease; perhaps you will admit that this corresponds to our clinical observations. In a fair percentage of clinical cases, a second class inhibitive obtains, while rarely do we find a first class inhibitive. Perhaps this also fits in with what we find in clinical observation of a large number of cases, namely, that comparatively few of our positive cases progress steadily and favourably, and very few make rapid uninterrupted progress against a definite tuberculosis.

Of the twenty-seven cases in my clinic series, the blood was done for aid in prognosis in fourteen, and for possible aid in diagnosis in thirteen. Of the fourteen done for prognosis, the first results were as follows:

One case gave first class inhibitive in May, 1920, was moderately advanced, underwent three months' sanatorium treatment, symptoms abated and have been absent since.

Two cases gave second class inhibitive. R. C. gave second class and positive fixation September, 1920, had advanced and extensive lesion with positive sputum, previously fever 100 and 101, since September, and on latest knowledge, December, 1920, holding his own with normal temper-

ature and feeling of well-being. Case D. C. gave second class and positive fixation August, 1920, had advanced and extensive lesion of three years' duration with cavity and much fibrosis, and in December, 1920, was going about, feeling well and carrying on light jobs.

Eleven cases gave third class inhibitive. The classification and progress of these may be noted as follows:

Incipient, two in number. A. B., clinically presumable tubercle, commencing with hæmoptysis of a pint. Third class inhibitive and positive fixation January 7, 1920; third class, weak positive fixation June 11, 1920, and so far she was stationary. Second class, fixation positive, August 8, 1920, and at this time feeling better than for years. It might be worth noting that O.T. had been given therapeutically for six months prior to this last date. (This case was later shown before the Laennec Society at their February meeting, 1921). January, 1921, third class, fixation positive, and had been in bed with pleurisy.

Case I. W. Clinically probable tubercle, gave third class and fixation negative November 6 1919, November 28, 1919, and April 14, 1920, stationary.

Moderately advanced, in number six. Two of these improved but gave second class within three months, three were stationary, one failed and died.

Advanced, three in number, all positive and advanced cases. One, D. McK., later gave second class and improved somewhat, the other two remained stationary.

Of the 73 cases in my private series, the blood test was done for aid in prognosis in 28 and for assistance in diagnosis in 45.

In my tabulation of the 28 cases in which the inhibitive test was done for aid in prognosis there were no first class inhibitive, while nine gave second class, six of these were found later in the column of those having made clinical progress, and three in the stationary column. Of these latter three, one was advanced and two far advanced. Three gave I³ plus and were found to progress. Twelve gave only third class inhibitive and eleven of these remained stationary or failed. The other was a case of arrested tuberculosis, had been teaching school for a year and keeping well. Although the test was done here primarily for prognosis, the result caused me to reconsider the present diagnosis. With a third class inhibitive and only a weak positive fixation, and with no symptoms nor signs for many months, I was forced to presume that tubercle as a factor had faded out

as had the reactions. Four gave negative inhibitive reactions, three of whom failed, and one remained apparently well. This last case also, although primarily tested with regard to prognosis and with the question of marriage in view, had because of the negative inhibitive and weak positive fixation to be reconsidered from the standpoint of present diagnosis. Had not her tuberculous disease faded out and was she not then apparently cured? Twelve months have now passed, the inhibitive remains the same, and our former patient has been married and doing her own housework for eleven months.

Individual examples of assistance in prognosis:

Case K. C.: Man of thirty, under clinical observation for four years, with incipient pulmonary tuberculosis from April, 1916. Tubercle bacilli present in sputum, weight then 186. Refused to enter sanatorium but promised to obey limitations if allowed to remain at home and work part time. Resting a few weeks at first, then working four, six, or eight hours daily as foreman in a factory, carried on with periodical examinations till December 16, 1919, when he reported feeling not so well and with slight fever, 99.9, 99.6. Sanatorium again advised and refused. Blood drawn, result third class inhibitive. Patient went to bed for a fortnight, got up and again tried to work, but could not stay at it. Chest, thick walled, but gave signs of extension of disease. X-rays showed definite extension. Blood again third class and weak positive fixation March, 1920; symptoms increased, chest pains, slight fever, throat sore and hoarse and he went to sanatorium. Patient still away and quite unable to resume work. April, 1921, still failing.

Case W. B.: Man of forty-three, incipient tuberculosis August, 1917. Tubercle bacilli present in sputum. Sent to sanatorium (Calydor), remained a number of months and returned to work, reporting for periodical examination. January, 1920, not so well, and came for advice about going away. Blood was third class, fixation strong positive. Chest signs not so good. Advised several months' rest. On his return felt better, is again at work, and blood second class, fixation positive.

Case L. D.: Girl of twenty-two, moderately advanced, February, 1918. Left upper lobe lesion active. Tubercle bacilli not found in sputum. Stereoscopic plates showed definite snowstorm appearance in left upper. Patient went home to the country for a year and returned to work with no symptoms and no local signs of active dis-

ease. Remained under periodical observation and in February, 1920, after a mild grippe, physical signs showed slight reactivation. Sanatorium advised, but patient begged to be left at her work as designing milliner. The blood test was appealed to and gave second class, fixation positive. Encouraged by this she was permitted to remain at work in the city with restrictions, including the giving up of teaching at night school. She was also given a course of tuberculin. In May signs of activity in chest were much less. Blood again second class, fixation positive. August, 1920, blood still second class, but negative fixation. Patient has gained some weight and is feeling very well. Later observations: December, 1920, third class inhibitive, weak positive fixation. Patient at work and apparently well. April 13, 1921, reported not eating nor sleeping well. Blood still third class but positive fixation, fever following week 100 and 101, and definite physical signs of reactivation of upper third left, front and back. Stopped work and was sent to bed. May 5, blood second class inhibitive and negative fixation, no fever, and patient feeling much better, rales much less in extent. Went to Muskoka Hospital next week. I should have given my patient warning to report more frequently for re-check with the drop to third class inhibitive in December, 1920.

Case C. A.: Wife of physician, age fifty, always very energetic, had been under semi-annual observation for ten years with frequent and often severe bronchitis. Husband was told that tubercle had probably been a factor; signs of old changes present. Stereos in November, 1919, showed definite degree of fibrosis and numerous large calcareous nodes out towards periphery and in the apices. January, 1920, bronchitis worse, slight fever, and coughing small quantities of blood. The doctor, her husband, asked whether should he take her south. Chest showed slight but definite signs suggestive of tuberculous activity, blood reaction was second class and positive fixation. Restricted activity advised, steady improvement ensued, inhibitive still second class and weak positive fixation in May. Symptoms referable to the chest reported slight or nil during the following summer. Patient going about and apparently well May, 1921.

May I now deal with the second part of my heading: "Diagnosis as aided by serological examination."

A few moments ago I described the possible range of results of the inhibitive test in cases of definite clinical or active tuberculosis. In clinical

normals (that is apparently normal) as far as tests have been done, the results are almost invariably third class or negative. If an apparently clinical normal gives a first or second class inhibitive reaction we presume he is reacting to tubercle. Caulfeild noted one or two such cases with clinical observations in one of his earlier papers on the subject.

If we attempt to rely upon the test in diagnosis we are frequently disappointed, particularly if we are content with but one observation. The interpretation of the results will frequently fail to give us any help unless the test is repeated at intervals. The reason for this is that the results in most cases reporting early for examination are third class or negative, which is the same as is found in normals.

Take for example five presumably tuberculous patients coming for diagnosis. Four of them have every reason to seek advice because they are failing, they are not reacting well to tubercle, or to put it in terms of serological results, they give only third class inhibitive. The fifth case may not really need to come to the physician. He is holding his infection in check. He comes saying that at present he is really well, but has been ailing off and on for some time. He only comes perhaps because he has previously promised his wife that he would do so, but assures you he is not ill, and is carrying on his work. In this man we might expect to find a first or second class inhibitive reaction. This corroborates our suspicions, aids and decides our diagnosis of tubercle, and in addition prognoses well. But as I said above, it is quite conceivable that it might not be so necessary to diagnose clinical tuberculosis in such a case. He had at any rate a better chance than the others to recover. To paraphrase just here, "To him that hath resistance to tubercle, shall be given additional assistance in diagnosis; and from him that hath not resistance, shall be taken away," and for the present, any further aid we had hoped to obtain in his case remains undisclosed unless by repeated observations we may chance to find the blood in better fighting mood.

Of the 13 clinic cases done for diagnosis, the laboratory results were as follows: first class inhibitive none, second class inhibitive five. (One of these five gave only third class inhibitive on primary test and second class inhibitive on next two tests,) third class inhibitive eight. Later clinical and x-ray observation on the five who were second class inhibitive proved four of them to be tuberculous and in the fifth (T.S.) tubercle could not be excluded. The diagnosis was bron-

chietasis following inhalation of a bone, which bone was later coughed up. This case was shown before the February meeting of the Laennec Society in Toronto. Of the remaining eight who were third class inhibitive our later opinions recorded three as non-tuberculous, one as not excluded and four as still suspect.

Of the 45 private cases done for diagnosis, cases in all of which tuberculosis was suspected in varying degrees, 11 gave second class inhibitive or better, 8 gave between third and second class, 23 gave third class and 3 gave negative inhibitive. Of the 11 giving second class or better seven were finally diagnosed clinical tuberculosis, and one of these showed tubercle bacilli in the sputum, three were suspected of having tuberculosis and in one tuberculosis was not excluded. Their symptoms were quite compatible with the idea of a tuberculous infection. Of the eight between third and second class inhibitive, three were diagnosed clinical tuberculosis, four were still suspect tuberculosis, and in one tubercle was not excluded. These totalled 19, giving better than a third class inhibitive, leaving 26 who showed only third class or negative. Of the latter twenty-six in my final tabulation, 5 were found in the column of clinical tuberculosis, 3 were in "the compatible" column, in 2 tuberculosis could not be excluded, in 13 tuberculosis was excluded as a clinical factor and two were classed as healed tuberculous lesions. One of the latter had given a negative inhibitive (a boy of 15 years who four years previously had coughed up blood showed definite chest changes on percussion and at 15 gave an intracutaneous reaction to $\frac{1}{20}$ mg. of O.T. of 30 x 70 mm. X-ray stereos corroborated diagnosis of tuberculosis in 1917.)

I might relate more fully the details of some cases.

A young man, F. H., who had weighed 190, and who had been exceptionally energetic, and scarcely knew his own strength, developed unexplainable weariness so that he would sleep Saturday afternoons, and most of Sundays. He had lost fifteen pounds. There were a few sweats and some chest pains, no cough, but slight mucoid phlegm. His chest showed slight indefinite changes. The stereos suggestive, but also indefinite. Tuberculin intracutaneous reaction to $\frac{1}{20}$ mg. O.T. only 20 x 15 mm., but the blood second class inhibitive and weak positive fixation. I diagnosed biological, even if not clinical tubercle, and placed him on a regime. Before he had fairly started to restrict his energies and improve his

way of living he came to report bringing up a mouthful of pure blood. I took this as corroborative, stiffened the regime, carried him on tuberculin, chiefly as a means of having him under weekly observation, and in five months he had regained most of what he lost and felt much better. Tuberculin intracutaneous reaction was more marked, namely, 35 x 65, and the blood I³, fixation doubtful. X-ray stereos six months later were more strongly suggestive and six months later again were presumable tuberculosis showing definite cluster in the left apex and moderate fibrosis in upper right, interpretation being made by Dr. G. E. Richards, Radiologist, Toronto General Hospital. This case was also referred to Dr. J. H. Elliott, who diagnosed definite pulmonary tuberculosis.

A second case, N. N., in which I chanced an appeal to the blood reaction for diagnosis came to me March, 1919. I found definite though slight chest changes on percussion, no adventitious sounds. Tuberculin intracutaneous test 20 x 25 mm. Suggesting an x-ray the patient produced an interpretation of stereo plates, which he said had decided his former physician that there was no tuberculosis. The interpretation practically decided me the other way. I made a tentative diagnosis of tubercle and he went to M. F. H. C. for seven months. Returned in January, 1920, feeling better but not well, demanding x-rays of stomach and chest. Blood gave second class inhibitive, negative fixation, negative Wassermann. Stereos more definitely suggested tubercle, skin reaction now 80 x 50 mm. and chest changes more marked. To me the diagnosis of tubercle was corroborated. In September patient again better in general condition. Blood result still second class and fixation negative. Skin reaction 90 x 60 mm.

A third case. "G. H., man of 43, physician. Pneumonia March, 1919, since then slight cough, very little phlegm usually, now, November, 1919, less than one drachm, tires very easily on any exercise. Limited area of impaired resonance inside the angle of the right scapula and a few small rhonchi here. Stereo plates indicate only slight suspicion of tuberculosis in right apex (a few minute clusters). Diagnosis, debility following pneumonia. Caulfeild's inhibitive reaction here gave second class with negative fixation to tuberculo antigens. Tubercle is a probable factor." This case was reported by me before the Academy of Medicine, Toronto, November, 1919 (4). Subsequently x-ray stereos indicated more

marked changes which were presumably tuberculous and a definite diagnosis was made. In addition to making the diagnosis in this case the blood reaction prognosed favourably. This has been borne out by later developments.

All of the x-ray examinations were stereoscopic plates, most of them taken at the Toronto General Hospital under the supervision of Dr. G. E. Richards. His interpretation was frequently used.

In summarizing, I would say that the study of the results of Caulfeild's inhibitive and the tuberculo-complement fixation reactions, and his interpretations thereof, together with the intra-cutaneous measured tuberculin test, taken in correlation with clinical and chest observations plus x-ray findings, has so broadened our view of that wide-spread infection Tuberculosis that we are convinced definite progress has been made in its study, and whereas we have had to admit till now that our ability to prognose has been limited to such facilities as clinical observations, physical examination and x-rays, we are happy to find real assistance in a biological test, which in addition to other advantages gives us some better conception of the lines along which the fight against tubercle is waged within the body.

In an earlier paper (5) I dwelt upon one peculiar characteristic of "this most variegated symptom-complex in its incipency." "It is not to be expected that pulmonary tuberculosis can be diagnosed in the early stages by any one simple procedure, such as the microscopic examination of the sputum or the placing of the stethoscope on the chest. The important fact, and one so often overlooked, is, that no one sign or symptom is necessarily present." It is therefore satisfactory to have further definite assurance in diagnosis, even to the point of being able to recognize the disease in the pre-clinical or biological stage, and with this advance (or inside) informa-

tion, and by treatment or restricted regime, to be able to keep the patient from reaching the stage of evident tuberculosis.

Having been fortunate in having had at hand during the past year the splendid laboratory facilities in the large D.S.C.R. daily clinic, as well as in private practice, I must declare a distinct feeling of loss on occasions when the laboratory was temporarily not available.

To generalize in closing: I recall that in London, in 1913, I heard Osler state that he was in the habit of saying to his students "If you know one particular disease well you know medicine, that one disease is syphilis." Should we not feel with our broadening comprehension of the nature of tuberculosis, that the widespread infection in which this Laennec Society is most interested needs consideration from a comparable viewpoint?

REFERENCES:

1. OGDEN, W. E.—The Difficulties in Prognosis in Pulmonary Tuberculosis, *Can. Med. Assoc. Jour.*, Vol. ii., March 1912.
2. CAULFEILD, A. H.—Investigations in Pulmonary Tuberculosis, *Jour. Med. Research*, 1911, xxiv., No. 1.
3. CAULFEILD, A. H.—The Correlation of Clinical Progress with the Results of Immunological Studies in Pulmonary Tuberculosis, *Archives of Int. Med.*, Oct., 1911.
4. OGDEN, W. E.—Need and Correlation of Sanatoria near Toronto for Non-tuberculous Pulmonary Diseases *Can. Med. Monthly*, Vol. V., July, 1920.
5. OGDEN, W. E.—Factors Frequently Overlooked in the Early Diagnosis of Pulmonary Tuberculosis, *Can. Med. Assoc. Jour.*, Vol. ii., Nov., 1912.
6. WATKINS AND BOYNTON—The Complement Fixation in Tuberculosis; Reporting Six Thousand Five Hundred Reactions. *J.A.M.A.*, Vol. 75, Oct., 1920.
7. PRITCHARD AND RODERICK—Complement Fixation Test for Tuberculosis, *J.A.M.A.*, Vol. 75, Dec., 1919.

CANCER OF THE STOMACH*

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CANCER of the stomach until recently was looked upon as an incurable disease, but we now know that it is probably the most favorable type of internal cancer for surgical removal. The first successful resection of the stomach was performed by Péan in 1879; shortly afterward his operation was modified by Billroth and carried out by him and others on many patients. It has been only within recent years, however, that surgery has been looked on as the only treatment for such cases. It is unfortunate that many physicians delay x-ray examination and surgical consultation until they are sure that a malignant growth is present, and as a result many patients are subjected to operations when the time for successful results has passed, and all that is possible is a palliative operation to extend life for from a few months to two or three years.

Incidence.—About 30,000 deaths from cancer of the stomach occur in the United States each year. When the fact is considered that about 70 per cent. of cancers of the stomach originate in the pyloric third and that the majority are amenable to surgical treatment at the time the diagnosis is first made, the necessity of education of the laity and of the medical profession with regard to this condition is realized at once. At present there is a high operative mortality and a short life expectancy when all cases are considered, but this is the result of delay. Five-year cures would be obtained in a high percentage of cases if the patients had been operated on at the time the diagnosis was first made or should have been suspected.

In preparing this paper I reviewed the histories of 1912 patients operated on at the Mayo Clinic between January 1910 and January 1921 (Table 1). One thousand five hundred (78.5 per cent.) were males and 412 (21.5 per cent.) females. The average age was fifty-three and seven-tenths years; the

youngest patient was eighteen years of age, and the oldest eighty-one. Seven hundred and seventy-one (40.3 per cent.) of the cases occurred in the sixth decade, and a little more than 22 per cent. in the fifth and seventh decades.

TABLE 1

CANCER OF THE STOMACH

Mayo Clinic, January 1, 1910 to January 1, 1921

		Per cent.
Operations	1912	
Resections	784	41.0
Palliative operations	417	21.8
Explorations	711	37.18

January 1, 1906, to January 1, 1917

Resections	531	
Patients heard from	450	84.74 of 531
Patients with five-year cures	86	19.11 of 450
Patients living fourteen years after operation	2	
Patients living thirteen years after operation	5	
Patients living twelve years after operation	7	
Patients living eleven years after operation	4	
Patients living ten years after operation	12	
Patients living nine years after operation	4	
Patients living eight years after operation	11	
Patients living seven years after operation	7	
Patients living six years after operation	4	
Patients living more than five years after operation	30	

Etiology.—The etiology of gastric carcinoma is by no means settled, but from what is known of malignant growths in other parts of the body trauma (mechanic, chemic, biochemic, or parasitic) must be accepted as the most important factor, and it is especially dangerous if continued over a long period. Some authors lay great stress on the diet and consider habitual over-eating, especially of coarse, hot, improper foods, or foods over-rich in protein, as of first importance. These same indiscretions are considered as predisposing to peptic ulceration. The question at once arises, therefore, of benign ulcer of the stomach as a strong predisposing factor in gastric malignancy. (Figs. 1 and 2). This subject has been much discussed at recent medical meetings; some physicians are decided that gastric cancer never develops on gastric ulcer, and others have a strong conviction

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tion that ulcer precedes cancer in a majority, if not in all the cases. My own conviction is that cancer in the stomach probably has much the same etiology as cancer in any other part of the body, and we know that chronic ulceration is the forerunner of malignancy in most cases at least. C. H. Mayo says, "The exact starting point of cancer of the stomach is unknown and probably will remain unknown, but the early cancers in this region have been seen in the mucosa on the borders of chronic ulcers."

In the review of the cases in the series herewith reported I was impressed with the frequency of a

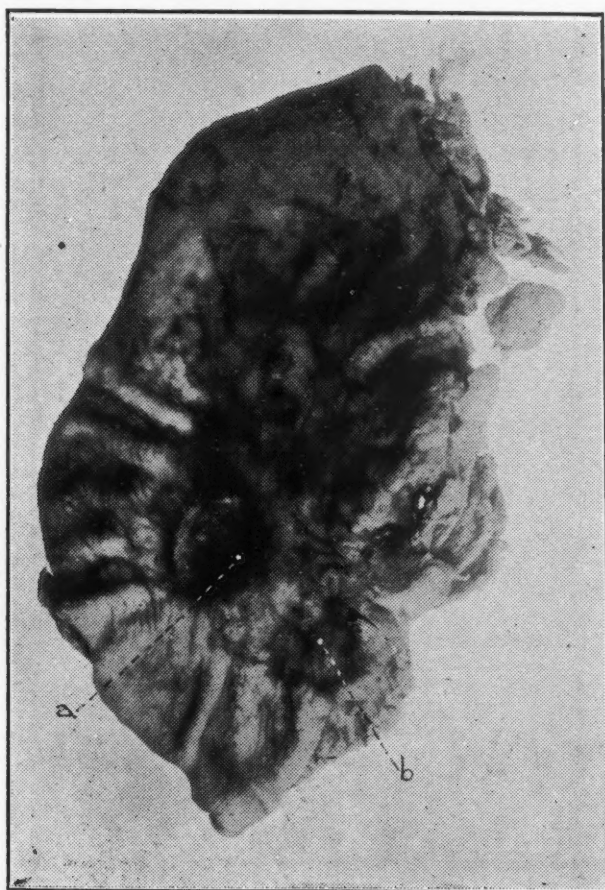


FIG. 1.—Case 300678—*a*, simple ulcer; *b*, carcinomatous ulcer.

history suggesting benign ulcer for years before the development of the malignant syndrome; and in other cases the history suggested ulcer, but on removal the pathologist found malignant degeneration. Rosenow has shown that mouth and throat infections are responsible for a large number of benign ulcers, and the fact must be accepted that destruction of cells in any part of the body always stimulates cell growth.

Furthermore, it is in the character of this growth that malignancy differs from normal tissue. Besides peptic ulcers we must include, as

predisposing causes of gastric cancer, tuberculous and syphilitic ulceration and actinomycosis. Unsanitary conditions of living, lack of personal hygiene, and disregard for the normal action of the gastro-intestinal tract no doubt exert an influence. Heredity appears to play a part in many cases, but the prevalence of the disease throughout the entire civilized world to some extent overshadows the family tendency.

Symptoms and physical examination.—At present symptoms definite for an early diagnosis of cancer of the stomach are not known. By early cases I mean those considered benign clinically, in which diagnosis is made only after removal of tissue. In the last ten years 1147 patients have

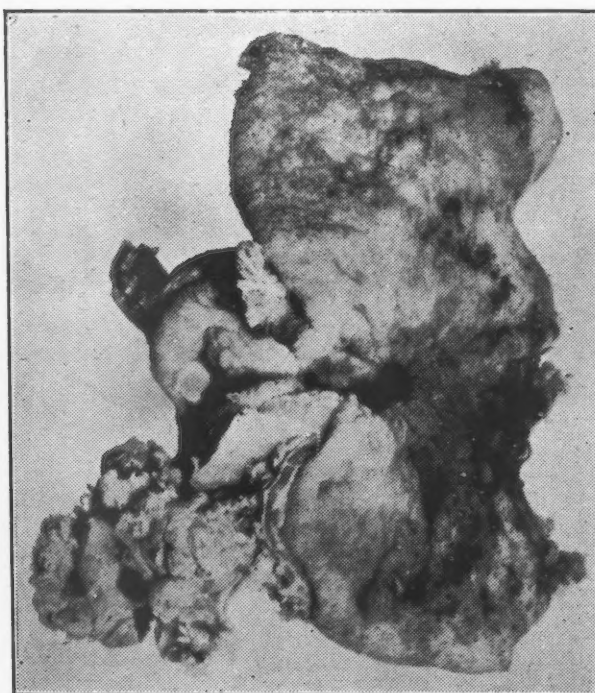


FIG. 2.—Case 264343—Carcinoma developing on ulcer.

been operated on at the Mayo Clinic with a surgical diagnosis of gastric ulcer; in 253 other patients with clinical diagnoses of ulcer the pathologists found malignant changes. It is unfortunate that, as Carman has expressed it, the patient's fate depends too much on his physician's opinion and too little on his true but hidden condition.

Since a surgeon is not consulted in most cases until digestive disturbances are marked, and very often not until pain is severe and persistent, and obstruction is noted, or a tumor can be palpated, nutritional changes are striking, anæmia of a more or less marked degree is present, and there are loss of strength and weight, nausea, anorexia, and blood changes. Hæmatemesis or melæna occurs probably in one-third of the cases.

Examination of the gastric contents, especially in the cases of obstruction, reveals abnormal chemistry, occult blood, and bacilli of the Oppler-Boas group. In the early cases without obstruction, free hydrochloric acid is frequently found, and in some cases it is in excess of the normal.

When the disease is well established the appearance of the patient is very suggestive. The skin is dry and sallow, often with a slight yellowish tinge. There is more or less loss of weight and strength, and the face especially in cases of obstruction, has an anxious, drawn expression.

no unnecessary pressure should be made, as the possibility of starting a hæmorrhage or causing perforation must always be borne in mind. Unless there is peritoneal involvement, the abdominal wall is relaxed and examination is easy. The amount of pain varies a great deal; in cases of ulceration pain is greater, while in cases of the medullary or colloid type of growth the pain is less than average. In advanced conditions fluid may be present. In about two-thirds of the cases the tumour, either definite or indefinite in outline, can be felt, and by its position and degree of

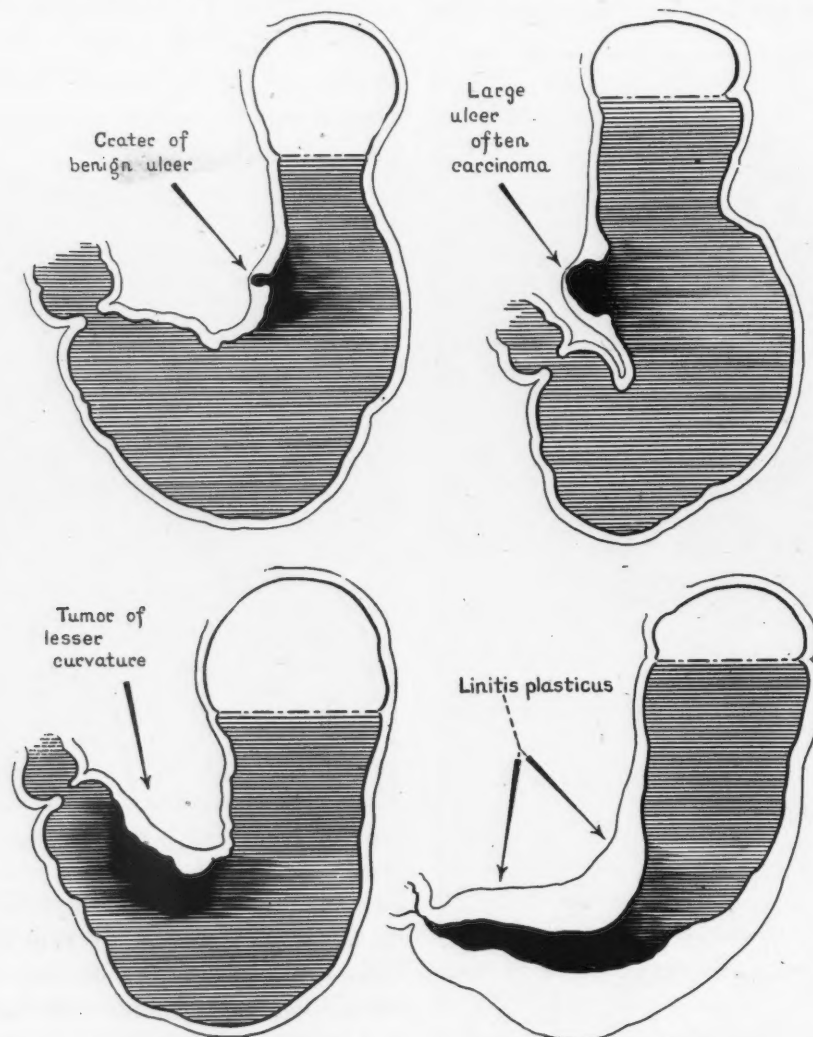


FIG. 3.—Diagrams of gastric lesions as they are observed in the roentgenogram.

Physical examination should be made in a good light, with the patient lying on a table, and if his condition warrants it, the stomach and intestines should be emptied thoroughly. It is important to have the entire anterior and lateral aspects of the abdomen exposed. Irregular prominences should be noted, as they often indicate local or metastatic growths. In palpating the abdomen

mobility valuable information is gained.

A tumour of sufficient size to be palpated of necessity means one of some months' duration, but in many of these cases the disease is still confined to the stomach and many five-year cures are obtained by operation. Furthermore, many more patients are saved from death by starvation as a result of gradually increasing obstruction,

and they have from one to three years' comparatively good health. They die a slow death from cachexia without much pain, which is easier for both the patient and the relatives than death from obstruction.

The examination of a patient with a gastric complaint is not complete without thorough roentgenographic studies, and the co-operation of a skilled roentgenologist is of the greatest help to the diagnostician. I am satisfied that as the number of reliable roentgenologists increases so will the number of early operations for cancer increase, and not until then can we hope to see much change in the mortality statistics of this disease. Modern roentgenologists can discover about 95

beyond dispute among careful observers who follow their patients to the operating room and examine both macroscopically and microscopically the fresh pathologic specimens.

Differential Diagnosis.—The differential diagnosis of malignancy of the stomach presents many difficulties, and the diseases mentioned in text books on the subject include most abdominal disturbances as well as many others to which man is heir. This is no doubt due to the fact that early cancer of the stomach *per se* does not cause symptoms on which a diagnosis can be based. Later, when metabolism is disturbed, the blood



FIG. 4.—Case 122965—Operable carcinoma of the pyloric end of the stomach.

per cent. of all gastric tumours and gastric ulcers. (Figs. 3, 4 and 5). If it is accepted that a gastric lesion is present, the x-ray is of the greatest help in determining whether or not it is operable. This information is only of value so far as the stomach itself is concerned. It is of no help in determining the presence or absence of metastasis.

In many cases with a history of peptic ulcer it is impossible to determine whether the ulcer is in the stomach or in the duodenum until the roentgenologist's report is received. This is of great importance, as we know that primary carcinoma of the duodenum, in spite of the frequency of ulceration, is very rare, only six cases in 4,500 consecutive cases at the Mayo Clinic, while the tendency for gastric ulcers to become malignant is



FIG. 5.—Case 358256—Linitis plastica, probably malignant.

picture changed, and other viscera are involved, or obstruction occurs, a number of other diseases must be considered. I believe I am right in stating that the only cases in which a reasonably early diagnosis can be made are those in which there is a preceding history of gastric ulcer with a recent change from the periodic attacks to a constant and progressively downward disorder. Furthermore, we know that the patients we have the best chance of curing are those on whom operation is performed before this change is noted clinically and in whom malignancy is found in a limited area of the mucous membrane at the edge of a typical peptic ulcer.

Cancers of the stomach are artificially divided into four groups: (1) scirrhous, (2) medullary, (3)

ulcerating, and (4) colloid. The rate of growth varies widely and is most rapid in the tumours in which the involvement is confined chiefly to the mucosa.

Surgical Treatment.—The location of the growth is very important from the surgical standpoint, since the closer it is to the cardia the more difficult is operation. Fortunately about 70 per cent. of all cancers of the stomach are primarily located in the pars pylorica, about 6 per cent. in the pars cardia, and the remaining 24 per cent. in the pars media. Many of the last do not come under observation until the tumour is palpable, as obstruction is a relatively late development.

The most interesting point in the morbid anatomy—I have referred to it before—is the development of carcinoma on a chronic gastric ulcer. Obstruction, deformity of the stomach, and adhesions to other organs are all late sequelæ. Hæmorrhage occurs in from 25 to 33 per cent. of cases, and perforation in about 4 per cent. Metastasis occurs early in some cases and relatively late in others. The amount of involvement of the lymph glands or of the liver is frequently, as McCarty has shown, out of all proportion to the size or apparent age of the local growth in the stomach.

In all early cases and questionable cases surgery is indicated. If the hæmoglobin is below 40 per cent. one or more pre-operative transfusions of from 500 to 700 c.c. of blood are indicated. If there is obstruction, the stomach should be washed repeatedly. This is of special benefit in restoring the tone if the stomach is markedly dilated. The last washing should be within one or two hours before the patient comes to the operating room. If the patient's condition is poor, especially in the

presence of chronic bronchitis or coëxisting nephritis, regional anaesthesia is the method of choice; if necessary, a little nitrous oxid or ether may be supplemented while a general exploration or traction is made on the stomach. The type of operation is best decided after carefully examining the local growth and determining the size and mobility of the stomach.

In conclusion I would urge (1) that surgical diagnosis be made early in all cases of suspected cancer of the stomach; (2) that special stress be laid on the danger of malignant changes in benign ulcer; (3) that surgeons accept their responsibility and explore more of the unfortunate patients early in the disease before the condition is such that only palliative surgery is possible; and (4) that the laity be educated to the fact that cancer is a curable condition in many cases if an early radical operation is performed.

BIBLIOGRAPHY

1. BILLROTH: Quoted by Hartman, H.: Cancer of the stomach. *Am. Jour. Surg.*, 1919, xxxiii., 209-214.
2. CARMAN, R.D.: The roentgen diagnosis and localization of peptic ulcer. *California State Jour. Med.*, 1920, xviii., 377.
3. MACCARTY, W. C., AND BLACKFORD, J.M.: Involvement of regional lymphatic glands in carcinoma of the stomach. From a study of 200 resected specimens. *Ann. Surg.*, 1912, lv., 811-842.
4. MAYO, C. H.: Cancer of the stomach and its surgical treatment. *Ann. Surg.*, 1919, lxx., 237-240.
5. PEAN: Quoted by Hartman, H.: Cancer of the stomach. *Am. Jour. Surg.*, 1919, xxxiii., 209-214.
6. ROSENOW, E. C.: The causation of gastric and duodenal ulcer by streptococci. *Jour. Infect. Dis.*, 1916, xix., 333-384.

SURGERY OF THE GALLBLADDER AND BILIARY DUCTS*

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THE results of operations for infection in the gallbladder and bile ducts are, as a rule, satisfactory. It is important to operate early in this type of case because the later developments usually add greatly to the risk. When, as a result of long-standing disease, the function of the liver has been so impaired that there is accompanying jaundice, the severity of the condition is greatly increased, or, if the infection has extended to the pancreas, the result may be quite different.

Within the past year or two, some very interesting and important experimental problems have been carried out by Rous and Larrimore on the "relation of the portal blood to the maintenance of the liver," and on "the biliary factor in lesions of the liver," from which some practical points may be derived. Mann has shown that a dog from which the entire liver has been removed, dies within a few hours, but he has further demonstrated that if he introduces glucose into the blood stream just before death the dog is immediately resuscitated and often remains in good condition for many hours. This phenomenon is not yet understood although it is possible that it may have some practical bearing and that as a result of it, a method may be determined of substituting for the liver function for a period of time. Several investigators in this Clinic and elsewhere are working on methods of obviating the untoward influences of jaundice in such cases. Whether the condition during the presence of jaundice is due to a toxæmia, to a disturbance of the functions of the liver, or to the influence of the bile in the blood has not been proved. This is surely a fertile field for investigation, and undoubtedly some of these questions will soon be settled. Bell has recently studied biliary cirrhosis resulting from the ligation of the common duct in animals, and has shown that the common bile duct may be completely closed for a number of

weeks resulting in a certain amount of biliary cirrhosis. When the relief of this obstruction is accomplished by anastomosing the gallbladder to the intestine, the liver regenerates and becomes normal in a short time. This work suggests that if something can be devised as a temporary substitute for liver function patients may often have a chance for complete recovery.

If there is a chronic pancreatitis associated with the cholecystitis this will be relieved by removing infected gallbladder. If, however, an acute pancreatitis is present with its associated fat necrosis, then the problem becomes very serious, and is probably best treated in the most conservative manner.

With regard to the etiology, especially with regard to the source of infection in the excretory apparatus of the liver, it is generally believed that these infections enter the tissues of the gallbladder and ducts by way of the blood stream and lymphatic vessels. While it is entirely possible that bacteria may gain entrance through the lumen of the bile ducts either from the liver or from the intestine, it is unusual, nevertheless, to find evidence to support the contention that infection often occurs in this manner. Infection gaining entrance by the portal circulation may pass to the gallbladder by way of the lymphatics which communicate between the gallbladder and the liver. Studies made of the source and extent of these infections emphasize the importance of the lymphatics in this region as distributors of the infection. Graham has shown, and others have corroborated, that in all cases of cholecystitis there is an associated hepatitis. Deaver and others report that certain cases of cholecystitis have an associated pancreatitis and further that in these cases the pancreatitis is secondary to the cholecystitis and that the infection extends from the gallbladder to the pancreas by way of the lymphatics. Observation and study of our own cases seems to support the contentions of Graham

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and Deaver, and we are impressed more than ever with the fact that these infections are rarely, if ever, confined to any one viscus. Besides the lesions in the liver and pancreas, a coexisting inflammation in the stomach, appendix or duodenum occurs so often that it must be given consideration in these cases. I have found an inflamed appendix with cholecystitis in the female, and with ulcer of the duodenum in the male so often that it seems more than a mere coincidence. I believe that in these cases the infection originates in the appendix and extends to the gallbladder and duodenum by way of the lymphatics.

One of the problems which must be considered in gallbladder disease is the recurrence after the operation of attacks similar to the original attacks. In some instances this is due to the formation of stone or to retained infection. Undoubtedly in other instances the recurrence is due to hepatitis or pancreatitis, and these may gradually disappear. It is also possible that the remaining symptoms may be due to an ulcer or to an inflamed appendix which should be attended to at the time of the primary operation unless there is some contraindication. I have been much interested in a small group of cases that are very difficult to explain. In each of these cholecystectomy had been performed for cholecystitis, in some cases with stones, and in some without. In all there was complete relief of symptoms which lasted from a few months to six years, followed by a recurrence of typical hepatic colic, in some instances with slight jaundice. In re-operating in these cases no disease was found unless it was a slight degree of hepatitis or pancreatitis. In each instance I established drainage of bile by placing a small tube in the duct, and apparently the patients have been permanently relieved. I expected to find overlooked or re-formed common duct stones at the second operation. In each instance the common duct was dilated but had more the appearance of compensatory dilatation than of the thick-walled and greatly dilated duct seen if a stone has recently passed. In each case a search was made for pathologic changes elsewhere, but none were found. These cases undoubtedly represent a group of patients that had had hepatitis or pancreatitis or both, probably at the time of the first operation, and the recurring attacks were exacerbations of these infections. These cases, provided they are cases of inflammation of the liver or pancreas, also seem to show that hepatitis and pancreatitis may occur without any marked gross change in these viscera. This small group

of cases brings up the question as to whether they should have been recognized at first, and whether they should have had common duct drainage established at the primary operation. They represent a group of cases to which, so far as I know, attention has not been called. If the recurring symptoms were due to the fact that the gallbladder was absent, it is strange that so few patients have such symptoms after a cholecystectomy. The symptoms of a recurrence must be due to some pathologic change and when this condition is recognized it may be possible to settle the question. I have seen about ten such cases.

Mann, in the Clinic, has been able to produce a specific cholecystitis by means of chemicals introduced into the blood stream. He showed that the solution gained entrance to the tissues of the gallbladder through the blood stream. He also showed that the reaction did not extend beyond the gallbladder and cystic duct. He injected chlorinated soda intravenously in dogs, and obtained the same reaction in a high percentage of his experiments. The reaction consisted in the breaking down of the capillaries and the infiltration of the wall of the gallbladder with blood. To produce the reaction he used a relatively large amount, that is about 5 c.c. to 10 c.c. for each kilogram of body weight. The reaction in the tissues of the gallbladder begins very soon and is completed in twenty-four hours. Having proved that the solution reaches the gallbladder through the blood stream he notes that the reaction is most marked when there is a good blood supply from the liver to the gallbladder. In some of the dogs a chronic cholecystitis finally developed. It seems to me that Mann's experiments demonstrate that any material in the blood stream may become lodged in the tissues of the gallbladder. These experiments support the theory of the selective activity of chemicals and bacteria and the importance of caring for dental sepsis and nose and throat infections in all cases.

* Pathologic lesions in the gallbladder and ducts are in most instances manifested by a clear-cut syndrome and the diagnosis is relatively easily made. In a certain group of cases of chronic inflammation, however, the diagnosis is not so easily made and certainly may sometimes be impossible. Cholecystitis considered clinically may be grouped according to several different types:

Type 1 is marked by typical hepatic colic; the pain is sudden in onset, very severe, occurs in the epigastrium, and radiates through to the back and right shoulder. Usually it is severe enough to

require morphine. After the severe pain has passed, which is usually in a few hours, there is soreness in the gallbladder region for a short time, but after that there is a remission of all symptoms until another attack occurs. These cases may run on for many years with the attacks occurring in the same manner each time, or in addition may gradually develop more or less constant symptoms, usually referable to the digestive tract, so becoming cases of gallbladder dyspepsia.

Type 2 is the so-called gallbladder dyspepsia which may occur secondary to the intermittent hepatic colic or without the forerunner, right-sided colic. The diagnosis of cholecystitis which is the cause of the dyspepsia is not so easily made if there is no history of attacks. It is much the same question that has been before us for a long time, chronic inflammation in the appendix being the cause of symptoms of gastric trouble. That the appendix and gallbladder when infected may be the cause of the dyspepsia is certain, but to say that a certain case of dyspepsia is caused by either of these when there is no local evidence of trouble in the appendix or gallbladder is quite a different matter. The first consideration in these cases is to rule out all the possibilities of the cause of the symptoms. Dyspepsia is very common and it is not likely that the gallbladder or the appendix is responsible for all of the dyspepsias that are not directly due to ulcer. Any disturbance in the cardiac, renal, or hepatic function is apt to be manifested by dyspepsia. The symptoms of dyspepsia caused by ulcer of the stomach or duodenum are entirely different from those caused by the so-called reflex condition. In ulcer cases the patients obtain relief by taking food or alkalies, while in the gallbladder cases the symptoms are made worse by food, or are not affected by it. The pain in cholecystitis cases, though varying in severity, is constant through the day, and does not give trouble at night, while the pain caused by ulcer occurs regularly at a certain time after meals and usually at a certain time at night. Certain foods especially may disturb patients whose trouble originates in the gallbladder, while all foods are apt to have the same influence in the ulcer cases, so that clinically the two types are recognizable and can be distinguished. Roentgenologists have reached a great degree of proficiency in diagnosing ulcers of the stomach and duodenum, and the differential diagnosis can often be settled by the roentgenogram. In our experience the roentgen ray has not been so helpful in diseases of the gallbladder even when stones exist. The

most severe types of cholecystitis often occur without stones and without changes recognizable in the roentgenogram. Recently a new method of reaching a diagnosis of lesions of the biliary tract has received considerable attention. This consists of the passing of a Rehfus tube into the duodenum in the usual manner, followed by the introduction of magnesium sulphate directly into the duodenum, which causes the relaxation of the sphincter of Oddi and allows the bile to flow from the duct freely into the duodenum, the magnesium sulphate presumably causing contractions of the gallbladder. By this method of examination it is thought that the bile from the common duct, from the gallbladder, and from the liver ducts is obtained separately and that by an examination of the bile the existing conditions are made out. Many of our patients suspected of gallbladder disease have been subjected to this examination by Hartman; some clinicians are very enthusiastic, while we have not found it a great deal of help. However, it should not be absolutely condemned without further study. Unfortunately the condition of the bile does not always reveal the condition of the liver ducts and of the gallbladder.

Type 3 is a certain infection retained in the gallbladder over a long period, such as commonly occurs after typhoid infection. Such quiescent infections may become active at intervals and cause local symptoms. The long-standing infection in the gallbladder that acts as a focus for more or less general infection constitutes one of the most interesting problems in gallbladder conditions. The possibility of a small focus being the cause of remote symptoms is now well understood, and while too much should not be attributed to the gallbladder in these cases, there is, nevertheless, sufficient evidence to prove that the infected gallbladder may be the cause of general infection and attention to it may relieve the symptoms. It is of course essential that there be some local evidence of cholecystitis before treatment is considered.

Type 4 is a diseased gallbladder associated with migraine. We have been unable to explain their relationship but we have had a number of such cases in which the migraine was permanently relieved by treating the gallbladder. So far as I know there is no theory of infection to account for the migraine, but it has occurred too often in the large series of cases to be regarded as a mere coincidence. It is also possible that any sort of operation might have relieved the migraine as is often the case in epilepsy.

Type 5 is a disease of the gallbladder associated with changes in the cardio-vascular system. It is sometimes difficult to distinguish between a gallbladder attack and an attack due to cardio-vascular disease with abdominal symptoms. In a few instances the gallbladder has been explored with the expectation of finding the trouble, when the lesion was probably cardiovascular in origin. This possibility must be constantly kept in mind. There are, however, some cases in which there is a well-defined cholecystitis associated with a cardiovascular condition. This may be endocarditis, myocarditis, or coronary sclerosis. The problem here, it seems to me, is to bring about the best compensation possible for the cardiac condition, and then to operate for the infected gallbladder. I have observed a number of such patients who were greatly benefited by this procedure. Besides the relief from abdominal attacks, there seemed to be improvement in the cardiovascular condition. It is quite possible that the gallbladder acted as a focus of infection which resulted in changes in the tissues of the heart and blood vessels.

Several problems are to be considered in the treatment of diseases of the gallbladder and biliary ducts. Most cases of cholecystitis and cholangitis are surgical though the milder ones may be treated conservatively. We are frequently confronted with the problem of when it is best to operate in the cases which we consider surgical. In the chronic cases, the operation may be performed at any convenient time. In the cases of cholecystitis without jaundice, which are seen during an attack, I believe it is usually best to wait until the attack has subsided. In choosing this plan however, we must keep in mind the possibility of rupture of the gallbladder, of extension to the pancreas, or of the development of jaundice, any of which is a serious complication, so that if the attack does not subside in the usual time it may be best to operate. If a severe degree of pancreatitis is suspected it is questionable whether or not to operate, but even with this complication, more patients will be saved by operating than by expectant treatment. The operation in cases of pancreatitis and fat necrosis must be performed with the least amount of traumatism possible. This will usually consist of opening and draining the gallbladder and of placing several small drains into the capsule of the pancreas where it is swollen and, frequently, oedematous and necrotic. It may be necessary to operate a second time after the acute stage has passed.

One of the most serious problems in these complicated cases is the presence of jaundice. Operation during the time the patient is jaundiced should, if at all possible, be avoided. If the jaundice is just beginning to show at the time the patient presents himself for treatment it may be best to operate without delay, while if he comes at a time when the jaundice is decreasing it is best to wait until it has reached its minimum. There is a great deal of uncertainty in operating on jaundiced patients. One of the greatest dangers is hæmorrhage from the cut surfaces and also from the mucous membranes, because of the marked change in the coagulation time, produced apparently by bile in the blood. A careful study of the coagulation time in the jaundiced patient does not always determine the amount of risk. A patient with a coagulation time of twenty minutes or more and a late calcium time may have none of the alarming symptoms from hæmorrhage; on the other hand, one with a coagulation and calcium time not far from normal may begin to bleed soon after the operation. If it is necessary to operate during the presence of deep jaundice, as will be the case when the duct is completely and permanently obstructed, then the coagulation time and general condition must be improved as much as possible before operating. The greatest amount of benefit will be derived from blood transfusions in conjunction with calcium administered intravenously. Transfusions should be performed before and after operation. Calcium introduced intravenously will usually bring the coagulation time to normal.

All functions of the liver must be greatly interfered with when the common bile duct is completely obstructed. The secretion of bile continues to a certain extent but not under normal conditions. The urea metabolism which takes place in the liver must be greatly disturbed as well as the metabolic process controlling the formation and storage of glycogen. In complete biliary obstruction the antitoxic power of the liver fails and the grave manifestations seen under these conditions are due chiefly to the poisons which flood the body and only in a small degree to the bile in the blood (Rollston). At the present time I think it can be safely said that the best method of combating the serious features in cases with jaundice is by transfusing with whole blood and repeating this if necessary. In many cases, after operation in which there was no bile drainage I have known the bile to start to flow soon after transfusion, and, usually, the flow is sustained,

which means recovery. Furthermore, in a common duct case which is progressing satisfactorily, if the flow of bile decreases to any extent, it is almost certain to indicate further serious trouble. To restore the function of the liver or to furnish a substitute until such time as the liver is capable of taking up its work again is the apparent means of correcting these difficulties.

The question of whether the gallbladder should be drained or removed, in cases of cholecystitis, seems to settle itself when we realize the etiology of infection and the tissues that are involved. It will still be necessary to drain some of the more severely infected gallbladders, removing them later if it seems best. If there is jaundice, I do not believe it is ordinarily advisable to remove the gallbladder. One of the greatest advances in the technique of cholecystectomy is the proof that it is safe to close the abdomen without drainage in clean cases. Willis reports the first group of cases satisfactorily handled in this manner. I have closed a number of these incisions without drainage and am convinced that if the cases are selected, and the abdomen is not closed when the tissues are infected, that convalescence will be easier, there will be less infection and fewer cases of stricture of the common duct. A drain in these cases is not entirely free from serious consequences and it is absolutely unnecessary in the majority of cases of cholecystectomy. On the other hand, although it may be safe to close the common duct after removal of stone providing a small drain

is placed down to the incision in the duct, I believe that in the majority of common duct cases, on account of the infection, it is better to provide the liver and duct with free drainage by placing a small tube into the duct and by suturing the opening accurately around it.

DISCUSSION

A better knowledge of the etiology of cholecystitis is necessary, and a realization of the relationship of the liver and pancreas to infections in the excretory apparatus of the liver.

The establishment of a syndrome for gallbladder dyspepsia is required, and also a better clinical knowledge of the cases, not only those in which there are gastric symptoms, but those in which the gallbladder is the focus of infection for remote symptoms.

The devising of some plan by which we will be better able to treat the cases deeply jaundiced, and to more successfully handle those in which there is associated pancreatitis with fat necrosis, should be forthcoming in the near future.

There is a tendency to remove the gallbladder in cases of cholecystitis although less radical procedures are employed in severe cases, thus dividing the treatment into stages if necessary. Our experience in closing the abdomen in clean cases convinces us that a distinct advance has been made in this direction.

THE ETIOLOGY OF RICKETS*

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INTRODUCTION

THERE IS probably no disease which is encountered more frequently in infancy than rickets. The incidence of this disease among the children of the labouring classes in large cities varies from 40 to 90 per cent. according to the figures of different observers. It is also frequently seen in the children of the well-to-do, both in city and country districts. Although rickets is not commonly a direct cause of death, it is undoubtedly an important contributory cause in a vast number of cases. Its importance in respiratory diseases has been emphasized recently by Park and Howland.

During the past seventy-five years a great number of investigators have endeavoured to discover the cause of this disease. The theories advanced are almost without number and are apparently limited only by the imagination of the different authors. The recent work of McCollum, Simmonds, Shipley and Park constitutes a distinct advance in the elucidation of this problem. By a variation in the concentration of different elements in the diet, these authors have produced bone lesions in rats, which bear a fundamental resemblance to those found in human rickets. In this paper is given a brief review of the literature on the etiology of rickets and a presentation of some of the recent work of McCollum, Simmonds, Shipley and Park. Through their kindness a number of bone sections of rats fed on different diets are here reproduced.

THE OCCURRENCE OF CONGENITAL OR FŒTAL RICKETS

The question of the occurrence of rickets *in utero* engaged the attention of a number of investigators for many years. As early as 1853 Virchow

found in a premature infant, microscopic changes in the bones, which he considered to be rachitic in nature. It is well known, however, that Virchow did not differentiate rachitic bone changes from those produced by syphilis and chondrodystrophy. Some years later Kassowitz became the chief exponent of this theory. He investigated the bones of a number of infants who had died shortly after birth or had been stillborn and found in over 85 per cent. of the cases microscopic changes which he considered due to rickets. However, his conception of the changes which occur in the bones in this disease was so mistaken that little or no importance can be attached to his views. Schwartz, Unruh, Feer, and others, chiefly as the result of clinical investigations, concluded that rickets occurred in 50 to 80 per cent. of newly born infants. The work of Kassowitz and his followers was critically reviewed by Pommer and Tschistowitsch, who demonstrated that many changes in the bones which Kassowitz had described as due to rickets were in reality the result of syphilis. The epiphyses of the ribs and long bones of 100 newly born infants were examined microscopically by Tschistowitsch, who was unable to make a definite diagnosis of rickets in a single case although in thirteen cases he found changes which he considered were possibly due to rickets. In an examination of over 100 cases Escher was also unable to establish the occurrence of rickets in newly born or prematurely born infants. Some what later the opinion was expressed by Marfan that rickets was due to a toxin or infection which acted on the bones *in utero* or during the first two years of life provided that a predisposition to rickets was present. A hereditary predisposition to the disease was believed by Siegert to be the underlying cause, while some years earlier Parrot had advanced the theory that it was due to congenital syphilis.

This much-discussed question of the occurrence of foetal or congenital rickets was finally answered

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decisively by Wieland, who conducted a careful clinical and histological examination of over 1500 cases. As a result of this investigation he concluded that rickets did not occur *in utero*. Schmorl, who is probably one of the greatest authorities on rickets, absolutely confirmed this conclusion. *It is thus evident that congenital or fetal rickets if it occurs at all must be an extremely rare condition.*

THEORIES OF THE ETIOLOGY OF RICKETS

Disturbance of the function of the glands of internal secretion.—The cause of rickets has been attributed at one time or another to a disturbance of the function of almost all the glands of internal secretion. The first to suggest a possible connection between the function of the thyroid gland and rickets was Lanz (1894). Under the influence of his work Knoepfelmacher gave thyroid extract to four rachitic infants but did not observe any favourable effect, while Heubner, who fed thyroid extract to a few rachitic children, believed that he obtained a slight improvement in their general condition. As the result of a number of experimental investigations, rickets was considered by Hoennicke to be the result of an insufficiency of the thyroid gland. No proof, however, has been given that thyroid extract exerts a favourable effect on the bone changes present in rickets.

In view of the well-known disturbance of calcium metabolism caused by the removal of the parathyroid glands it is reasonable to suppose that these glands might be concerned in the production of rickets. Erdheim (1906) found that in rats from which he had removed the parathyroid glands the dentine of the teeth remained uncalcified. It is well known that parathyroid tissue is essential to life and when it is all removed death rapidly ensues. The partial removal of the parathyroid glands is followed either by the death or by the complete recovery of the animal after a comparatively short time has elapsed. That is, partial removal of the parathyroid glands cannot be accomplished with such nicety as to give rise with any regularity to a long continued period of insufficiency. When the parathyroids are removed in the rat, in contradistinction to the results obtained in most other animals, death does not ensue, the reason being that in the rat parathyroid tissue is present in places which are not accessible and the result is that parathyroidectomy is almost necessarily incomplete. It is highly improbable that Erdheim could have produced a chronic insufficiency by partial parathyroidec-

tomy and there is little doubt that the conditions he described were due to other causes, in all probability to faulty diets. Based on Erdheim's work, Hecker evolved a rather elaborate theory of the cause of rickets. He assumed that normally the parathyroid glands rendered innocuous certain metabolic products which exerted an injurious influence on the skeletal system while in rickets this function was lacking. What the metabolic poisons were, he did not state. The parathyroid glands of rachitic infants were examined by Schmorl, who found no evidence of any abnormalities.

Rickets was believed by Stoeltzner to be due to a disturbance of the function of the suprarenal glands. He reported in detail the results obtained by the administration of adrenalin to 71 cases and concluded that its administration produced a diminution in the severity of the symptoms (cranio-tabes, rachitic rosary, enlargement of epiphyses, etc.) and also improved the general condition of the patients. The following year he reported the results of a histological examination of the bones of nine rachitic infants which he had treated with adrenalin, and concluded that he found evidences of healing. The suprarenals of a number of rachitic infants were examined by the same author, who stated that a diminished amount of adrenalin and chromaffin tissue was present in comparison to the amount in normal infants. Schmorl showed that the bone changes which Stoeltzner found could not be interpreted as healing rickets, and also that no difference could be found in the amount of adrenalin and chromaffin tissue in the suprarenal glands of rachitic and non-rachitic infants.

A hypersecretion of the reproductive glands was believed by Stocker to be the cause of rickets. He advanced this theory as the result of only one experiment. Klotz reported a favourable effect on the clinical course of this disease as the result of feeding an extract of the hypophysis and concluded that this gland was a factor in the production of rickets. The carotid bodies were considered to be glands of internal secretion by Betke who stated that rickets occurred after their removal.

Mettenheimer in 1898 claimed to have produced a beneficial effect on the course of rickets by feeding thymus gland. During the past twenty years a great number of investigators have endeavoured to produce rickets in animals by the removal of this gland. (Basch, Klose, Matti, etc.) As a result of these investigations it was for some

years considered that the removal of the thymus gland produced rickets. It has been conclusively demonstrated, however, by Pappenheimer in the rat, and by Renton and Robertson, and Park and McClure in the dog, that the extirpation of this gland does not cause rickets to develop in the skeleton.

Most of the investigators who have attempted to produce rickets by a removal of the organs of internal secretion have kept their animals confined in cages, generally in the dark, and in all probability have fed improperly balanced diets. This whole conception of a properly balanced diet includes not only a knowledge of the fat protein and carbohydrate content of the food but also the concentration of different indispensable organic factors (vitamines) and the ratio of the various inorganic elements. It is highly probable that many of the changes which have been obtained in animals after the removal of the different glands of internal secretion were not the result of the removal of these glands but were due to confinement and improperly balanced diets.

No evidence of any value has been advanced that rickets is due to a disturbance of the function of the glands of internal secretion.

Infection. One of the chief advocates that rickets is the result of an infection was Morpurgo. In 1902 he reported the isolation of a gram positive diplococcus in young rats with typical rachitic changes. During the next few years a number of papers on the same subject were published by this author, who considered that he produced rachitic changes in the bones of young rats by the injection of cultures of the gram-positive diplococci. The changes which occur in the bones in rickets were believed by Koch to be chiefly a chronic vascularization and the result of the action of bacteria. He injected streptococci into dogs and considered that rickets developed as the result of this. It was reported by Pappenheimer that when a number of stock rats were killed they were found to be rachitic, and he concluded that "rachitic changes in the bones and teeth occur in young albino rats as the result of spontaneous diseases possibly of infective origin." Rickets was considered to be an infectious disease by Edlfsen (1901) and quite recently Paton and Watson have emphasized the probability that this factor plays an important part in its etiology.

In human beings suffering from rickets, infections of different kinds are very prone to develop, but there is no evidence from the clinical course of this disease that infection precedes its occurrence.

The influence of faulty diets has not been excluded by the different investigators who have endeavoured to prove that rickets is due to an infectious process.

Confinement and Defective Hygienic Conditions:—

It is not surprising, in view of the fact that the causes of most diseases have been attributed by older medical authors to foul air and bad hygienic surroundings that these factors have been advanced to explain the occurrence of rickets. Glisson in (1650) in his remarkable monograph on rickets, when he speaks of scurvy as a complication, states that it may be produced from the faulty regimen of the child, especially from unsuitability of air and surroundings (1). In 1746 Astruc in his *Treatise on the Diseases of Children* states: "In order at least to check the progress of the disorder the patient should go into the country and breathe a good and free air." Toward the end of the 18th century the symptoms of rickets and many other diseases were considered by Struve to be hindered by the diligent residence in the open air. It is thus evident that the lack of fresh air is one of the oldest theories advanced to explain the occurrence of rickets.

Kassowitz has been the main advocate during the past fifty years of the theory that rickets is due to bad air. The "respiratory poisons" in the badly ventilated winter quarters of the poor people were considered by him to be an important factor in the production or aggravation of this disease. He even went so far as to emphasize the importance of the ammonia fumes from the unchanged diapers and the beds on which the children lay, and considered that the repeated inhalation of these fumes caused the infants to be more rachitic than if they lived only in an atmosphere of bad air. Wachsmuth believed that rickets was caused by an increase of CO₂ in the blood due to a lessened evaporation from the lungs through unfavourable hygienic conditions. It was thought this excess of CO₂ changed the acidity of the bone tissues and increased the solubility of the calcium salts present, thus interfering with their deposition in the bone.

In 1906 Von Hansemann advanced his theory of domestication as the cause of rickets. This

(1) I am indebted to Dr. P. G. Shipley who called my attention to the following paragraph in the original Latin edition. Some time later I found in an article on "Seventeenth Century Writings" by Still the same paragraph apparently from an early English translation.

"Scorbutus cum hoc affectu interdum conjungitur. Estque vel hæreditarius vel fortè etiam in tam tenellâ constitutione per contagium contractus, vel denique de novo ex malo regimine infantis & imprimis ex inclementia aeris & loci ubi educatur productus."

theory included not only the effects of bad air but also of confinement and the general unhygienic condition of thickly populated cities. He based his theory largely on the observation that wild animals in their native state seldom or never develop rickets but when confined in the zoological gardens develop most severe grades of this disease. Shortly after this Findlay, without knowledge of Von Hansemann's work, stated that he considered that confinement was the important etiological factor in the production of rickets. The arguments he advanced in favour of this theory were the production of rickets in dogs, which he confined, and also the observation that negroes and Italians were not subject to rickets in their native lands where they spent much of their time in the open air but were almost invariably affected when they lived in large cities of the United States.

During the past few years a great deal of work has been done by the Glasgow school of investigators on this subject. Ferguson in a careful study of the social and economic conditions of the laboring classes in Glasgow found that the cubic space per person in families with cases of marked rickets was 32 per cent. less than in families who were free from the disease and also that the cleanliness of the house was distinctly better in the non-rachitic than in the rachitic families. She concluded that "Inadequate air and exercise seem to be potent factors in determining the onset of rickets." Paton, Findlay and Watson reported that "Pups kept in the country and freely exercised in the open air, although they had actually a smaller amount of milk fat than those kept in the laboratory, remained free of rickets while the animals kept in the laboratory all became rickety." In view of our present knowledge of the dietary factors necessary for the production of rickets it is evident that the diets these investigators used (oatmeal and milk) cannot be eliminated as a possible factor in the production of the changes reported by them. Whether they actually produced rickets in their later experiments cannot be determined as they do not publish any photomicrographs of sections of the bones of their animals. Four weeks old puppies were confined in small cages for two months by Howland and Park and fed a diet of bread and milk with later an addition of meat. These animals developed deformities of the legs which in the living animal bore a striking resemblance to rickets but an examination of sections of the bones showed nothing but an osteoporosis. Baldwin performed similar experiments. His dogs received a diet which was considered

adequate by Professor E. V. McCollum and the results obtained were practically identical with those found by Howland and Park. *A survey of the reports available shows with certainty that rickets cannot be produced by confinement alone, the diets and all environmental conditions being optimal.*

Lack of Sunlight (Effect of Ultra Violet Rays): Closely concerned with the previous theory is the suggestion made by some authors that rickets is due to a lack of sunlight. The importance of this factor was emphasized many years ago by Palm, whose carefully written report on this subject is very admirable. Neve in commenting on the conclusion arrived at by Paton, Findlay and Watson, as the result of their confinement experiments, expressed the opinion that sunlight might be the determining element in the prevention of rickets. He stated that in Srinagar where the children are poorly fed, filth diseases abound and where poverty, squalor and overcrowding are universal, rickets is practically unknown. The rarity of the disease was attributed by him to the fact that "when the sun shines whether in winter or summer the poor come out of their dirty close little rooms and work and sit about in the sunshine."

It is of interest in considering the possible effect of sunlight to observe the geographical distribution of rickets. This disease is most prevalent in the temperate zone of North America and Europe, but occurs very rarely among the natives of Southern Italy, Africa, Greece, Turkey, Persia, India, China and Japan. The climates of these countries are such that the days are generally bright and sunny. This fact combined with the seasonal incidence of rickets in the temperate zone and also its great prevalence in cities are strong arguments in favor of a beneficial influence of sunlight. The fact that in high altitudes rickets is not as severe or occurs so frequently as in the lowlands has been emphasized by Feer, who considers that mountain sunlight is an outstanding factor in the cure of this disease. On the other hand rickets is very prevalent in Rio Janeiro, which is almost on the equator. Also, it is practically unknown in the northern part of Norway, in the Hebrides and in Iceland, regions where there is little sunshine for the greater part of the year. It has been pointed out by Mellanby that in certain islands of the Hebrides the children spend the greater part of their time in dark hovels in which the light enters only through the door, and yet these children never develop rickets. It is therefore obvious that although sunlight in certain countries may be the predominant factor in

the prevention of rickets the rarity of this disease in the Arctic and other regions requires a different explanation.

During the past two years a number of German investigators have treated rickets by means of the ultra-violet rays and have reported astonishingly favourable results. Four rachitic children were treated in this manner by Huldshinsky and roentgenograms of the bones showed a marked deposition of calcium after the children were exposed to the ultra-violet rays every second day for two months. At the same time, however, they were given calcium phosphate. The following year twenty-four additional cases were reported by the same author. No changes were made in the food but in most of the cases 1.0 to 1.5 grms. of calcium phosphate were given daily. The treatment consisted in exposing the chest and back to the rays of the mercury vapour quartz lamp, three times a week. The duration of the exposure was gradually increased from three to twenty minutes. In all the twenty-four cases the author considered that he attained a complete healing of the rachitic process after twenty-two to twenty-six exposures.

The favourable results obtained by Huldshinsky were soon confirmed by other investigators (Putzig, Riedel, and Erlacher). These authors made minor variations in the treatment such as the length of the exposure, the distance of the lamp from the body surface, etc., but in all cases uniformly favourable results were obtained. The beneficial effects were secured without any change in the diet or the addition of any medication and were as marked in the winter and spring as in the summer. The calcification of the bones was confirmed by roentgenograms. Shortly after Huldshinsky's first publication, Hess and Unger reported the effect of daily treatment of violet rays upon five children by means of the mercury vapour quartz lamp. The entire bodies of the infants were exposed daily for twenty minutes over a period of three months but it was concluded that this method of treatment did not lead to a definite improvement in the rickets nor did it benefit their general condition. These authors also found that a "liberal allowance of light could not prevent the development of this disorder." They state: "Violet ray treatment cannot be considered the equivalent of heliotherapy. But the fact that rickets is exceptional in the arctic region where there is a lack of sunshine for the greater part of the year is a strong argument against its predominant influence. During the

past year these authors have apparently reversed their views. In a preliminary note on the cure of infantile rickets by sunlight they report that the exposure of children to sunlight led in every instance to a "marked improvement in the rickets" and that "the general condition of the infants was also benefited." In the same paper and also in a subsequent communication they state that they have cured rickets by means of the ultra violet ray.

The reason for the beneficial effect of exposure to ultra violet rays is not known. The exposure of the body to either the mercury vapour quartz lamp or to sunlight produces a pigmentation of the skin. Whether this pigment contains an organic factor or whether the exposure liberates an organic factor in the body which is essential for the cure of this disease is not known. With our present knowledge it is idle to speculate on this subject. *It is very probable that the actinic rays of the sun or similar rays from the mercury vapour quartz lamp have a specific effect on the prevention or cure of rickets.*

Deficient calcium and phosphorus intake (defective absorption and desposition): In view of the well known fact that tertiary calcium phosphate comprises over 85 per cent. of the inorganic constituents of bone it is not surprising that many investigators have endeavoured to produce rickets by feeding animals a diet deficient in one or both of these elements. As early as 1842 it was shown by Marchand that the bones of a rachitic child contained less calcium and more organic material than the bones from a non-rachitic infant. In 1866 Roloff considered that he produced rickets in young animals by feeding a calcium deficient diet. Young lambs were fed diets deficient in phosphorus and deficient in calcium by Weiske and Wildt, who concluded that in neither case did the diet produce any chemical or physical changes in the bone. In contradistinction to this, a few years later Voit reported that he produced rickets in a young dog by feeding a low calcium diet for three to four weeks. More recently microscopic studies of the bones of dogs fed on a calcium poor diet were made by Miwa and Stoeltzner who concluded that rickets was not present but a condition which they designated as pseudo-rachitic osteoporosis. Osteoporotic changes were found by Reimers and Boye and later by Aron and Sebauer in the bones of young animals which had been given a diet deficient in calcium. The bones from the animals used by Aron and Sebauer were examined microscopically by Gottling, who sharply differentiated the condition present from

rickets. In contradistinction to the above work it was considered by Dibbelt "that the anatomical and chemical characteristics of rachitic changes in bones" were produced in the skeletons of dogs by feeding a low calcium diet. However, one of the bones from his animals was examined by Schmorl, who stated definitely that the condition was not rickets but an osteoporosis. Schmorl also was unable to produce rickets in dogs by feeding a low calcium diet. *Proof has therefore not been given that rickets can be produced by feeding young animals a diet deficient in calcium or phosphorus.*

A great number of experiments were undertaken in an endeavour to prove that rickets was due not to a deficient intake of calcium but to either a defective absorption by the digestive organs or to an inability of the body to deposit it in the bones from the blood stream. Marchand (1842) reported that he obtained considerable quantity of lactic acid in the urine of a rachitic infant and concluded that in rickets lactic acid caused a solution of the calcium of the bones which was then excreted in the urine in combination with this acid. It was believed that the lactic acid came from fermentation of carbohydrates in the intestine. The production of rickets by the feeding or subcutaneous injection of this acid was reported by Heitzmann, but shortly after it was shown by Heiss that feeding lactic acid did not increase the calcium excretion. Baginsky reported that the withdrawal of calcium salts from the diet of young animals produced rickets, but if lactic acid was given at the same time the condition became more marked. A lack of HCL in the stomach which allowed the calcium to pass through the intestines without being dissolved was believed by Seemann to be the main actor in the production of this disease. At this point it might be well to recall Wachmuth's theory in which he assumed there was an increase of CO₂ in the blood and cells which hindered the deposition of the calcium salts.

Quite recently the theory was advanced by Pritchard that rickets was due to the defective oxidation of a relative excess of food with the production of lactic acid and other organic acids which caused a withdrawal of calcium from the body. In view of our present knowledge of the inorganic metabolism of the body a loss of an appreciable amount of calcium in combination with organic acids is very improbable. *No conclusive evidence has been advanced that rickets is due to a diminished absorption of calcium or to an*

increased secretion of this element in combination with organic acids.

Errors in the concentration of the organic constituents of the diet: A great deal of emphasis has been laid on the amount of food received and the proportions of the organic constituents as a possible cause of rickets. Three main theories have been advanced, first that rickets is due to a lack of fat in the food, second that it due to an excess of carbohydrates either alone or accompanied by a lack of fat, and third that it is due to an excess of the total amount of food received.

In 1897 it was believed by Cheadle that the main factor in the production of rickets was a dietary defect. Based on Bland Sutton's experiments of successfully raising rachitic lion cubs by the addition of cod liver oil, milk and powdered bones to their meat diet, Cheadle concluded that the chief defect appeared to be an insufficient supply of animal fat and therewith also in certain cases a deficiency of earthy salts in the form of phosphates. For many years the writers of most of the textbooks dealing with rickets have considered that the main factor in its production is an excess of carbohydrates in the food. The experimental work on the effect of a lack of fat and an excess of carbohydrate on the retention of calcium salts has been reviewed by Orgler, who showed that the results obtained were so variable that no conclusive evidence could be derived from them. Esser and later Feer have laid considerable emphasis on overfeeding as the cause of rickets. They give no experimental proof of the theories advanced.

Vitamines: As early as 1881 Lunin called attention to the fact that mice could not live on a diet of casein, milk fat, milk sugar and salts and concluded that there must be present in milk other substances which are indispensable for the nutrition. In 1906 it was stated by Hopkins that no animal could live on a mixture of pure protein, fat and carbohydrates even when the necessary inorganic material was supplied. It was considered by this author that there were other minor factors in the diet of which the body took account and that rickets and scurvy were due to a lack of these factors. Six years later he named these materials "accessory food substances." Funk, in 1912, while working on the cause of beri-beri isolated a substance which he called the beri-beri vitamine. This name has since been used to designate this whole group of substances necessary for normal growth, the exact chemical nature of which is at present unknown. McCollum and his co-workers

first showed that there were at least two so-called vitamins and named them fat soluble A and water soluble B.

The first attempts to produce rickets by a deficiency of fat soluble A in the diet were undertaken by Mellanby, although Hopkins and Funk had already suggested the possibility that rickets might be due to a lack of an indispensable food substance. Mellanby's experiments are of the greatest importance as they have introduced into the study of rickets an entirely new aspect of this problem. He concluded as a result of his experiments that "it therefore seems probable that the cause of rickets is a diminished intake of an anti-rachitic factor which is either fat soluble A or has a somewhat similar distribution to fat soluble A." Although subsequent studies have shown that his conclusions are not entirely correct, Mellanby's work has served as a stimulus to further investigations which promise to bring about a definite solution of this problem.

The etiology of rickets as shown by the recent work of McCollum, Simmonds, Shipley and Park:

Experimental rickets have been produced in rats by McCollum, Simmonds, Shipley and Park under conditions which rule out all except dietary factors. The rats were kept in scrupulously clean cages which were large enough to afford ample exercise and the rooms in which the cages were situated were airy and had the average room light. A sufficient amount of fat carbohydrate and protein was present in the diets to meet the requirements for the normal growth of the animals. The concentration of the different inorganic elements and the anti-rachitic factor which is possibly not identical with soluble A were then carefully controlled. By a variation of these factors a profound disturbance in the deposition of calcium salts in the cartilages and bones of growing rats were obtained. By means of two different types of diets it was found possible to produce changes in the bones which bore a fundamental resemblance to the conditions found in human rickets.

A number of years ago the production of rickets was attempted by feeding a low phosphorus diet but convincing results were not obtained. Recently it has been shown by Sherman and Pappenheimer, and Shipley, Park, McCollum and Simmonds in rats, and by Mackay in kittens, that the vitamin component of the diet cannot be regarded as the sole factor in the production of rickets. However, if rats are fed a low phosphorus diet together with an insufficient amount of

the anti-rachitic factor, the other organic and inorganic constituents remaining at an optimal concentration, changes are produced in the bones which resemble those present in human rickets. (Fig. 3). It was found that the more the calcium ion was increased above the optimum, the phosphorus and anti-rachitic factor remaining insufficient, the greater was the exaggeration of the elements which composed the rachitic lesion. The second type of diets by means of which rachitic-like changes were produced in the bones of rats, contained an insufficient amount of calcium and the anti-rachitic factor, the other organic and inorganic constituents remaining at an optimal concentration (Fig. 4). The changes produced in the bones by diets with this disproportion of calcium and phosphorus differ more in minor details from the bone lesions of human rickets than the lesions produced by diets containing a low phosphorus and anti-rachitic factor. With these diets the more the phosphorus is increased above the optimal concentration the further the bone seems to tend away from the rachitic type. It is to be remembered that with the first type of diets with a low phosphorus content the rachitic changes became exaggerated when the calcium was increased above the optimum.

It is interesting to note that Howland and Kramer have shown that in most rachitic infants the concentration of calcium in the serum is normal or only slightly reduced, while the concentration of the inorganic phosphorus is markedly reduced. Kramer, Tisdall and Howland found that in infantile tetany in which rachitic changes were also present, the inorganic phosphorus in the serum was normal and the calcium markedly reduced. These findings are of considerable interest when viewed in conjunction with the above work on experimental rickets.

The results obtained from different experiments undertaken by McCollum, Simmonds, Shipley and Park tend to show that the anti-rachitic factor may not be identical with fat soluble A although it has a somewhat similar distribution. It has been found that cod liver oil contains a great deal of the anti-rachitic factor while contrary to the general impression given by a report of the Medical Research Council of Great Britain, butter fat does not contain a large amount of this element. The administration of cod liver oil to a rachitic rat on a diet low in fat soluble A and phosphorus produced in the bones a marked deposition of calcium. A similar deposition also occurs in the bones of rachitic infants after the

administration of cod liver oil. This has been demonstrated by Howland and Park by means of roentgenograms. Howland and Kramer have also shown that at the same time the administration of cod liver oil causes the phosphorus concentration of the serum to be increased to the normal or above the normal level.

An insufficiency of the anti-rachitic factor alone with a normal concentration of the inorganic elements in the food will not produce rickets in rats. Neither will a calcium deficiency alone or a phosphorus deficiency alone produce rickets. The conditions produced are of an osteoporotic nature.

The confirmation of the experimental production of rickets can be made only by the microscopic examination of bone sections. Experiments in which the diagnosis is based on other criteria are inconclusive and of little value. The presence of the following changes in the bones are necessary before the diagnosis of rickets can be made.

1. Abnormal persistence of cartilage cells

KEY TO ABBREVIATIONS

OST.—Osteoid tissue	MET.—Metaphysis
OS.—Osseous tissue	T.—Trabecula
MED.—Medulla	CART.—Proliferating cartilage cells

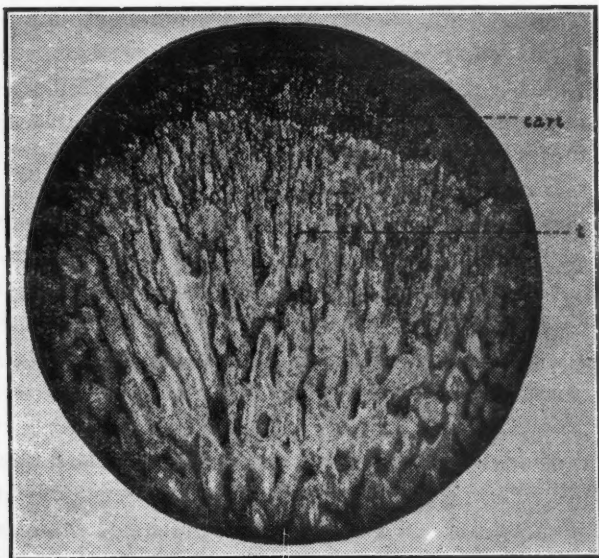


FIG. 1—A low power magnification of a section of normal bone. This shows the proliferative cartilage cells arranged in columns which do not project beyond a definite regular line which marks the provisional zone of calcification. The calcium is laid down at this zone around each column of cartilage cells. This produces what is called the calcified intracellular substance. The cartilage cells are then removed by loops of blood vessels from the shaft of the bone. Osteoblasts migrate with the blood vessels and are deposited on the calcified intracellular substance and form osteoid tissue which in turn is calcified and the bone trabeculae thereby formed. The layer of osteoid is normally very thin (Fig. 6) but in rachitic bones this layer becomes markedly thickened (Fig. 7).

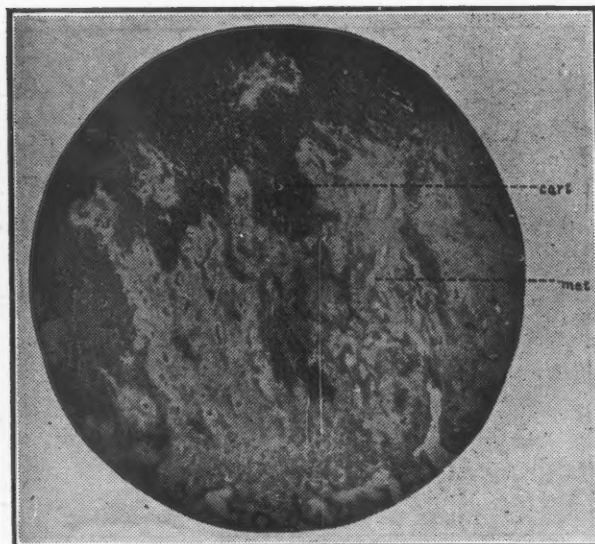


FIG. 2—A lower power magnification of a section of a long bone from a case of human rickets.

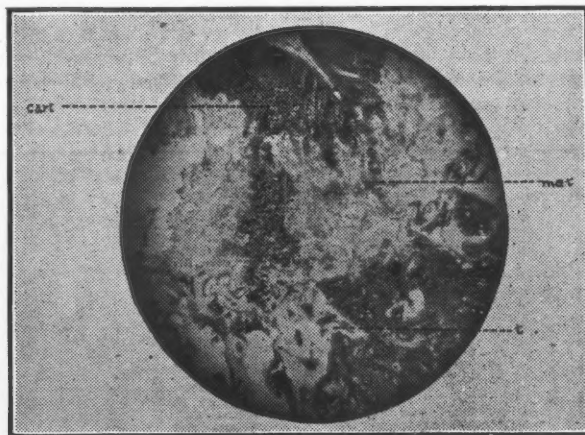


FIG. 3—A low power magnification of a section of a long bone from a rat fed on a diet deficient in phosphorus and the anti-rachitic factor. The calcium intake was normal. Typical rachitic changes are present.

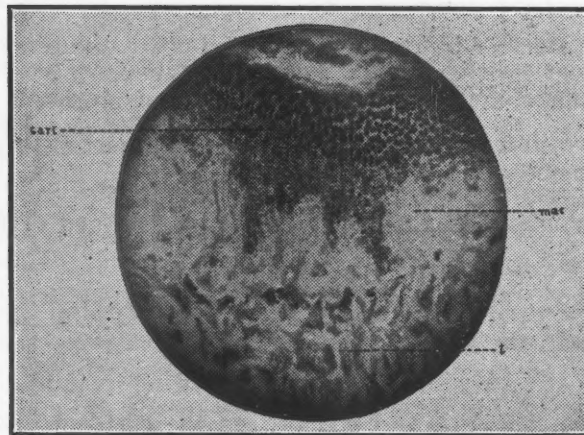


FIG. 4—A low power magnification of a section of a long bone from a rat fed on a diet deficient in calcium and the anti-rachitic factor. The phosphorus intake was normal. Typical rachitic changes are present.

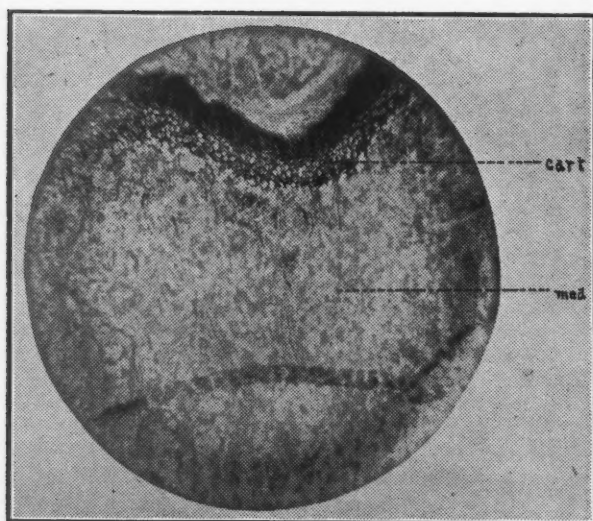


FIG. 5—A low power magnification of a section of a long bone from a rat fed on a diet deficient in the anti-rachitic factor (fat soluble A?). The calcium and phosphorus intake was normal. This section shows that there is no abnormal persistence of the proliferative cartilage cells and the calcification of the cartilage is complete. The trabeculae are few in number and very thin. A high power magnification of these trabeculae showed no increase in osteoid tissue. This is a typical picture of osteoporosis.

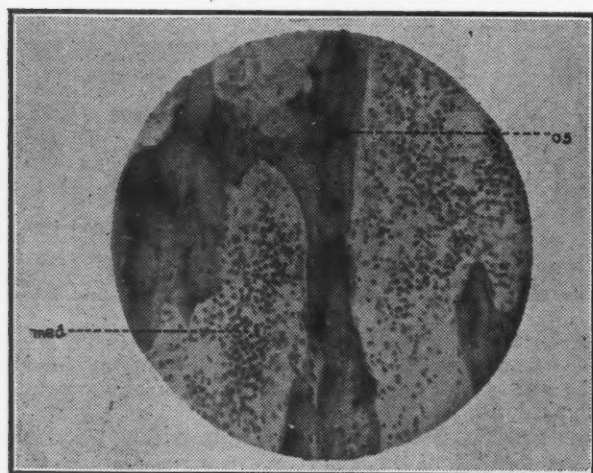


FIG. 6—A high power magnification of a trabecula from a normal bone. The normal physiological layer of osteoid tissue is extremely narrow.

which may undergo degeneration and metaplasia.

2. The provisional zone of calcification in the proliferative cartilage is either not formed or is very irregular.

3. The cartilage is invaded by blood vessels from the shaft.

4. An abnormally wide growing region or metaphysis is formed between the cartilage and shaft. This consists of blood vessels, connective tissue, islands or projection of unchanged proliferative cartilage cells, degenerated cartilage



FIG. 7—A high power magnification of a trabecula from a rachitic bone (diet low in A and in phosphorus). A great increase in osteoid tissue is to be noted.

cells and osteoid tissue (bone tissue without calcium salts).

5. Overproduction of osteoid.

These changes are well shown in Figs. 2, 3 and 4.

CONCLUSION

Pathological conditions have been produced in the bones of rats, which bear a fundamental resemblance to the bone lesions present in human rickets. These changes have been produced by feeding (1) diets containing an insufficient amount of phosphorus and an unidentified organic factor, the other organic and inorganic constituents being at an optimal concentration; (2) diets containing an insufficient amount of calcium and the unidentified organic factor, the other organic and inorganic constituents being at an optimal concentration.

Congenital or foetal rickets if it occurs at all, is an extremely rare condition. No proof has been given that rickets is due to a derangement of the function of the glands of internal secretion and no evidence has been advanced that infection, confinement or defective hygienic conditions are more than contributory factors in the production of this disease. A deficiency of phosphorus alone, calcium alone or the anti-rachitic factor (fat soluble A?) alone, in the diets given to rats will not produce rickets.

The geographical distribution of rickets may be explained on the basis of the effect of the diet, and possibly of sunlight, on the prevention of the disorder. In the tropics the children are not only exposed to sunlight but their diets generally have a large percentage of leafy vegetables which contain a considerable quantity of both the anti-rachitic organic factor and the inorganic salts.

The anti-rachitic organic factor is contained in large quantities in cod liver oil and so far as it is known rachitic lesions cannot be produced by any means provided this oil is supplied in the diet. The use of fish as a staple article of food by the inhabitants of the far North gives an adequate explanation for the infrequent occurrence of rickets in that region.

The possible effect of sunlight on the prevention and healing of rickets and the favourable results obtained by means of ultra violet rays, are extremely interesting when considered with the known effect of the anti-rachitic organic factor. When cod liver oil is given to rachitic children it causes a marked deposition of calcium salts in the bones. Ultra violet rays appear to have an identical effect. The question arises whether the ultra violet rays produce or cause to be liberated in the body a substance similar to that present in cod liver oil, which stimulates the deposition of calcium salts in the bones, or on the other hand whether the beneficial effect is due to the emanation of certain rays produced by the oxidation in the body of the unidentified substance in cod liver oil, which rays might be similar to those present in the light from the mercury vapour quartz lamp, or sunlight. It is known that the permeability of plant cells for certain inorganic salts is increased by exposure to light. It is also known that fatty oils emit light on oxidation. Further experimental work is necessary for the settlement of this most interesting question.

The recent work of McCollum, Simmonds Shipley and Park, although it constitutes a distinct advance in our knowledge of the production of experimental rickets in animals, does not solve the problem of human rickets. Many children develop this disease when they receive a diet of cow's milk which contains a large amount of phosphorus and calcium. In fact, rickets may be seen in certain infants receiving almost any diet. Nevertheless, it is a striking fact that the diets of most of the children who develop rickets are ill-balanced and low in the anti-rachitic organic factor. In all probability it will be shown that rickets in the human is due to dietary defects with a possible combination in certain cases of an insufficient amount of sunlight.

The author wishes to take this opportunity to thank Professor E. V. McCollum, Miss Nina Simmonds, Dr. P. G. Shipley and Professor E. A. Park for their kindness in allowing him to reproduce photomicrographs of the bone section of rats fed on various diets. He also wishes to thank Professor Park and Dr. Shipley for their helpful criticism of the views expressed in this paper.

ADDENDA

On account of lack of space most of the references, which are over 100 in number, have had to be omitted. The following are the references to the recent work of McCollum, Simmonds, Shipley and Park. References 11-14, were received by the author while the present paper was in press. These investigators have prevented the development of rickets in rats, which were on rachitic producing diets, by exposing the rats to either ultra violet rays or sunlight.

REFERENCES

- 1.—The Production of Rachitis and Similar Diseases in the Rat by Deficient Diets—E. V. McCollum, Nina Simmonds, H. T. Parsons, P. G. Shipley and E. A. Park. *Jour. Biol. Chem.*, 1921, xlv, 2, 333.
- 2.—The Effect of Cod Liver Oil Administered to Rats with Experimental Rickets.—Shipley, Park, McCollum, Simmonds, and Parsons. *Jour. Biol. Chem.*, 1921, xlv, 2, 343.
- 3.—A Pathological Condition Bearing Fundamental Resemblances to Rickets of the Human Being Resulting from Diets Low in Phosphorus and Fat-soluble A: The Phosphate Ion in Its Prevention. Shipley, Park, McCollum and Simmonds. *Johns Hopkins Hosp. Bull.*, 1921, xxxii, 363, 160.
- 4.—Cod Liver Oil as Contrasted with Butter Fat in the Protection Against the Effects of Insufficient Calcium in the Diet.—McCollum, Simmonds, Shipley and Park. *Proceedings of the Society for Experimental Biology and Medicine*, 1921, xviii, 275.
- 5.—The Production of Rickets by Means of a Diet Faulty in Only Two Respects. Shipley, Park, McCollum, and Simmonds. *Proceedings of the Society for Experimental Biology and Medicine*, 1921, xviii, 277.
- 6.—The Effects on Growing Rats of Diets Deficient in Calcium. McCollum, Simmonds, Shipley and Park. *Amer. Jour. of Hygiene*, 1921, i, 4, 492.
- 7.—The Relative Effectiveness of Cod Liver Oil as Contrasted with Butter Fat for Protecting the Body Against Insufficient Calcium in the Presence of a Normal Phosphorus Supply.—Shipley, Park, McCollum and Simmonds. *Amer. Jour. of Hygiene*, 1921, i, 4, 512.
- 8.—The Production of Rickets by Diets Low in Phosphorus and Fat-soluble A.—McCollum, Simmonds, Shipley and Park. *Jour. Biol. Chem.*, 1921, xlvii, 3, 507.
- 9.—Lesions in the Bones of Rats Suffering from Uncomplicated Beri-beri.—Shipley, Park, McCollum, Simmonds. *Jour. Biol. Chem.*, (in press).
- 10.—Rickets and Rickets-like Disease Produced in Rats by Deficient Diets.—Shipley, Park, McCollum, and Simmonds. *Dental Cosmos* (in press).
- 11.—The Prevention of the Development of Rickets in Rats by Sunlight.—Shipley, Park, McCollum and Simmonds. *Proceedings of the Society for Experimental Biology and Medicine*. (in press).
- 12.—Is There a Substance Other Than Fat-soluble A Associated with Certain Fats which Plays an Important Role in Bone Development?—McCollum, Simmonds, Shipley and Park. *Jour. Biol. Chem.*, (in press).
- 13.—The Prevention of the Development of Rickets in Rats by Sunlight.—Park, Powers, Shipley, McCollum and Simmonds. *Jour. Amer. Med. Assoc.*, (in press).
- 14.—The Effect of Starvation on the Healing of Rickets.—McCollum, Simmonds, Shipley and Park. *Bull. Johns Hopkins Hosp.* (in press).

Retrospects

RECENT ADVANCES IN OUR KNOWLEDGE OF THE ALKALOIDS OF OPIUM

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TO the comparative pharmacology of the opium alkaloids relatively little attention was paid until the last decade. Previous investigation of their action upon the central nervous system had resulted in aligning these substances in a series extending from the greatest depressant, morphine, to the most powerful convulsant, laudanine.

In the average sample of opium next to the morphine content of about ten per cent. and contributing respectively about six and one per cent. of the total crude drug, stand narcotine and papaverine.

Narcotine stimulates the respiration. Straub (1) took advantage of this fact when suggesting its use to combat the deleterious effect of morphine upon the new-born. As an obstetric anæsthetic he offered "narcophine," a combination of the two alkaloids. It was claimed the narcotine here acted synergically with morphine as regards analgesia although antagonizing the severe respiratory depression. For similar and further reasons Bürgi (2) introduced the mixture of opium alkaloids known as pantopon; although widely used, the greatest proven advantage of the latter is that it provides a convenient form of giving accurate opium dosage.

The peripheral action of the alkaloids attracted the attention of Pal (3). He pointed out the depressing effect of papaverine upon smooth muscle and drew a distinction, based upon both chemical structure and pharmacological action, between two groups of opium alkaloids. On the one hand are the pyridin-phenanthrene alkaloids and on the other those of the benzyl-isoquinoline group. Examples of the first group are: morphine, codeine, thebaine, of the second: papa-

verine, narcotine, narceine. The pyridin-phenanthrene group has the property of increasing the tone of smooth muscle while the benzyl-isoquinoline alkaloids all diminish it. These results are irrespective of innervation.

Macht (4) has greatly extended our knowledge of the action of these alkaloids on smooth muscle, analyzing more closely their chemical relationships. This has resulted in associating the smooth-muscle-depressant capacity with the possession of the benzyl-nucleus; for example, two isoquinoline derivatives, hydrastinine and cotarnine, not possessing the benzyl group fail also to relax smooth muscle.

Such results led to Macht's discoveries regarding the action of benzylbenz oate, benzyl-alcohol, etc. which clinicians are now testing for the relief of various spastic conditions such as dysmenorrhœa, asthma, and pylorospasm. It is to be hoped that there will soon accumulate evidence based on exact observations by means of which the indications for the employment of benzyl derivatives may be clearly defined.

In the meanwhile Hanzlik (5) has produced an interesting study of the action of the opium alkaloids and related substances upon the heart. He objects to the reference to the papaverin group as "specific depressants for smooth muscle" because their capacity to inhibit tone extends also to cardiac and voluntary muscle as well as to simple forms of protoplasm.

Hanzlik finds in amphibian hearts that the benzyl-isoquinoline derivatives, papaverine, chelidonine and narcotine all diminish tone and rate. Morphine, on the other hand, is a stimulant. Thus far the chemical analogy is confirmed. Cotarnine, however, stimulates or depresses cardiac tone according to the state of the muscle at the time, and Hanzlik takes occasion to point out a number of variable effects exhibited by this drug and by hydrastinine and hydrastine. Although characterizing as too dogmatic the current tendency to distinguish sharply the two alkaloidal groups along the lines of the relation of structure to pharmacological action, his own results tend as a whole to lend support to Macht's conception.

Practical deductions from Hanzlik's work are important in reference to the employment of opium alkaloids for any purpose in conditions of cardiac weakness. Morphine, he states, would not be expected to injure the heart while some degree of circulatory collapse might perhaps be instigated by the cardiac action of the benzyl-isoquinoline group.

The "stimulating" effect of morphine upon the heart is probably never exhibited in the clinic, for (aside from the difference in species) the concentrations of morphine presumably required would be toxic to the nervous system. Furthermore as Hanzlik points out, stimulation of cardiac tone and rate may mean decreased instead of increased cardiac output, complete filling of the organ being interfered with.

Evidently many results of value are to be expected from the continuation of work upon the opium alkaloids along these lines.

REFERENCES:

1. STRAUB, W.: *Biochem. Ztschr.*, 1912, 41, 419.
2. BURGI, E.: *Deutsch. Ztschr. f. Chir.*, 1913, 125, 211 256.
3. PAL, J.: *Wiener Med. Wochenschr.*, 1913, 63, 1049.
4. MACHT, D. I.: *J. P. & E. T.*, 1918, ix., 389.
5. HANZLIK, P. J.: *J. P. & E. T.*, 1921, xvii., 445.

SURGERY IN THE TREATMENT OF PULMONARY TUBERCULOSIS

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FROM the day of Hippocrates to that of Brehmer, Detweiler, and Trudeau, there was but small abiding place for Hope in the breasts of those who were charged with the care of the phthisical sufferer. She took lodgings instead with the sufferer himself, and often gave him more ease than did his physicians. At last there came Brehmer, who substituted the sanitarium for the home, the open window for the closed one, fresh air for the room stove, good food for a low diet; and thereby saved many lives. His principles stand today as fundamental in the treatment of tuberculosis. But there remained many patients, as there still remain many today, in whom the destructive effects of the tubercle bacillus precluded all hope of ultimate cure; even though, with

the help of sanitarium care and a strict invalid regime, they were able to hold the horrid spectre at bay for a time. Such were "the chronics," at once the triumph and the despair of what our friends to the south call "tuberculosis therapy." In former days these died early; now they die late, or, at any rate, later. Yet is their life a burden,—to themselves a burden physical and mental; to those who pay, a burden financial.

What is their lesion? Cavities and fibrosis and erosion of vessels. What is their life? Cough and expectoration, the handkerchief and the sputum box, the reclining chair and magazines, or bed rest and the tray. And their outlook? On the whole, downward. And yet, to these also came fresh hope when Forlanini introduced, now over thirty years ago, his method of artificial pneumothorax. Even today, the general practitioner is largely ignorant of this beneficent procedure, which has brought healing to thousands who were otherwise doomed. The injection of nitrogen gas into the pleura of one side, the other lung being practically sound, compresses the lung, puts it at absolute rest, inhibits the respiratory movements of that side, and thus allows Nature to complete her reparative fibrosis undisturbed. It was an enormous therapeutic advance. But its limitations soon became evident, of which the chief proved to be pleural adhesions so extensive as to obliterate the pleural space, and thus to render impossible the injection of air. At this point, surgery came upon the stage. If the problem is to put the lung at rest (so argued the pioneers) and if artificial pneumothorax is impossible, resection of a number of ribs ought to accomplish that object. It would occupy too much space to relate the history of surgical progress in this line. It began in the late nineties of last century. The early workers were all German and Swiss: Spengler, Brauer, Turban, Friedrich, Wilms, and, last and most important, Sauerbruch. A recent article of the last-named forms the text of this writing (1). At first the extent of the rib resection was too small, and little good was done. Friedrich made it too great (1907-1910) and lost an undue proportion of his patients (25-30 per cent.) through shock, pulmonary cedema, and failing heart. Sauerbruch seems to have struck the happy mean; his operation is now standard; and his results are astonishingly good.

Technically the procedure, which is called extra-pleural thoracoplasty, consists in the removal of portions of all the ribs behind, from the first to the tenth inclusive, usually in two stages. The

pleura is not to be entered. This cutting of the bony framework allows the ribs to sink in, and x-ray photographs show a collapse and a compression of the affected lung but little short of that effected by a complete pneumothorax. Not only is the lung, and its contained cavities, compressed, but it is also prevented from going on with its physiological work. It no longer breathes; its movements are abolished; it rests. Nature's efforts at repair are therefore unhindered. She gradually replaces diseased tissue with fibrous tissue; healing advances through scar. Such, briefly, is the rationale of the method. And it can be replaced by no other, because it comes into its right only when all others have failed.

Sauerbruch's article is a general one. The chief points may be resumed somewhat as follows. Surgery can indubitably cure certain forms of pulmonary tuberculosis. Patients of the chronic type, with cavities, expectorating large numbers of bacilli daily, can be made free of cough, sputum, and bacilli; and therein lies the great social-economic importance of surgical treatment, in that such patients become innocuous to their community. This type, with old standing fibrosis and cavities, is the best for surgical measures. Cure is by fibrosis, that is, scar; and scar means contraction. The flattening of one side of the chest, the narrowing of the intercostal spaces, the pulling up of the diaphragm, and the pulling across of the trachea—all these show Nature's efforts to cure. But these are often insufficient; cavities remain, and are held wide open because the chest wall, after all, is rigid, and pleural adhesions fasten the lung to the ribs. Reason fairly clamors for a breaking of the bony ring of the thorax that the lung may be allowed to collapse. It is obvious that the other lung must be healthy, or practically so; and it has been estimated that only about 10 per cent. of all cases fulfil this indication of relatively unilateral disease. Moreover, inasmuch as artificial pneumothorax is possible in about half of these, and is always first to be tried, there remains only about five per cent. of all cases for which surgical procedures come to be considered. Yet even this small percentage, considering the enormous numbers of the tuberculous, represents a very large field for surgical endeavour. Although the rule holds that one lung must be practically healthy, a slight, old, and arrested lesion in it does not constitute a formal contraindication. Yet it is important to be sure that such a lesion is really arrested; and upon this point the opinion of the expert in tuberculosis,

especially if based upon an extended period of observation of the case in question, is of the greatest value. The danger lies in the extra work suddenly put upon the sound lung by a rib resection (or indeed a too rapidly induced pneumothorax) on the sick side, and a consequent lighting up of supposedly arrested disease. Ordinarily, tuberculosis invades both lobes, even if confined to one lung; so that a rib resection must include practically all the ribs on the affected side. Yet in many cases the disease affects the upper lobe first and worst. Thus it happens not infrequently that the pleural space is obliterated over the upper lobe and remains free over the lower one, and an artificial pneumothorax will be found to compress effectually the lower lobe, the upper one remaining untouched. The latter is also more often the seat of cavities. Under these circumstances Sauerbruch recommends strongly the carrying out of a thoracoplasty over the upper lobe (resection of the first to the fifth or seventh ribs) while leaving the lower to be compressed by the artificial pneumothorax. This he thinks an ideal combination. The lower lobe, after healing, can then be gradually allowed to resume its function, while the cavity-containing upper one remains permanently compressed by the thoracoplasty. A total thoracoplasty (first to eleventh ribs inclusive) brings about a shrinking in the volume of the lung amounting to 300 to 500 ccm. At this rate, cavities if not too large, can be obliterated by the approximation of their walls. More important, in the reviewer's experience, is the fact that the normal respiratory movements of the thoracic cage are abolished, and the lung no longer expands and contracts; it is put at rest. The breath sounds, on auscultation, become blowing, transmitted from the main bronchi; the vesicular murmur and râles disappear largely.

After a few paragraphs upon technique, the anæsthetic, the after-care, the occasional employment of phrenicotomy in the neck to paralyze the diaphragm on one side, and the necessity in a few cases of apicolysis, Sauerbruch goes on to quote his results. His Zurich experience amounted to 381 cases; that of Munich (October 1918 to February 1921) 57 cases. In the latter, the operative mortality was nil, as the earliest death occurred from pneumonia eight days after operation. Mortality within the first four weeks was 7 per cent.; while in Zürich it was 12 per cent. In fifteen patients, that is 26 per cent., sputum was abolished altogether, and "cure" was to be expected. Forty-two per cent. were improved. The

remaining 25 per cent. remained unchanged or grew worse. Late deaths are hardly to be ascribed to the operation. These late figures correspond pretty well with those of the Zürich experience, published in his large book on Thoracic Surgery (1920) which showed 35 per cent. "cures" (disappearance of cough, sputum, and bacilli, ability to work, general well-being); and 40 per cent. "considerably improved." And when (he says in conclusion) we consider that the patients referred for surgical treatment are practically all only such as have already undergone long years of invalidism in sanatoria, seriously ill people with cavities, whose sputum is loaded with bacilli, we need hardly be ashamed of such results.

REFERENCES:

SAUERBRUCH, *Zeitschrift für Tuberkulose*, Bd. 34, May, 1921.

Idem. "*Chirurgie der Brust Organe*., 1920."

BRONCHIAL ASTHMA

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IT is undeniable that our conception of bronchial asthma has undergone a radical change in the last decade. In 1911, at a meeting of the British Medical Association, at which this subject was discussed, asthma was regarded as a reflex neurosis, and the only reference to the modern view was the hint thrown out by the late Dr. G. A. Gibson that an explanation might eventually be found along the lines of anaphylaxis. Since then so far has the pendulum swung that in a recent work on Medicine (Miller in Nelson's loose-leaf system) asthma is defined as 'an anaphylactic manifestation characterized by recurrent attacks of paroxysmal dyspnoea, due to spasm of the bronchioles, developing as a result of exposure to a foreign protein to which the individual is sensitized.' As Rolleston says in a recent paper, "this may be too exclusive," and it is probably preferable to adopt Freeman's view that three factors are necessary: First, the protein sensitization; second, the hereditary diathesis; and third, precipitating nervous influences. Whether or not nasal polypi act as a reflex nervous irritant *per se*, or by favouring the growth of bacteria, or both, or by favouring the formation of a new protein is open to discussion.

As pointed out by Charles McNeil, the name "Anaphylaxis", and the first experiment that

demonstrated it, came from France. C. Richet, in 1902, while studying the toxic action of the glycerine extract of the tentacles of sea-anemones, found that reinjection of a dog with this extract, after an interval of a few days, was followed rapidly by general collapse, distressed breathing, vomiting, diarrhoea and death. To this reaction, he gave the name "anaphylaxis", or something opposed to immunity.

Meltzer in 1910 drew attention to the similarity between bronchial asthma and anaphylactic shock. Experimentally, a guinea pig may be sensitized to horse serum by injection. If after ten days or so a second injection is given, the animal dies of asphyxia, due to spasm of the smooth muscle of the bronchioles, so that exchange of air ceases. This result may be counteracted by the use of adrenalin or atropine. Sewell further showed that guinea pigs after previous sensitization, may react to intranasal instillation of horse serum by developing typical bronchial asthma. Brodie and Dixon showed that the vagus is the only motor nerve to the bronchial muscles, and contains both constrictor and dilator fibres, and that spasm of these muscles, especially the circular fibres, is produced by irritation of the nerve itself or of the respiratory mucous membrane. Therefore, by putting these facts together, we can see how protein applied in the upper respiratory tract of a sensitized animal, irritates the constrictor fibres of the vagus, and produces a stenosis of the small bronchi by causing a spasm of their circular muscles; and in this way the mechanism of a typical attack of bronchial asthma is explained. Dale has made an important contribution to the understanding of this subject; he has shown that there are two main effects in the anaphylactic state: first, a depression of capillary tone as a result of injury to the capillary endothelium; and second, an increase of tonus of the plain muscle throughout the body. These two factors differ in their intensity and in the amount of representation in different animals. Thus, in guinea pigs, death occurred from intense constriction of the bronchial muscle; and in rabbits, from acute distension of the right heart owing to constriction of the pulmonary artery and its branches; that is, from the second factor. On the other hand, in cats and dogs, general capillary engorgement and resulting arterial depletion, take the primary place. In this connection, the influence of anaesthesia is interesting, as it may modify or prevent anaphylaxis in guinea pigs and rabbits, but not in cats and dogs where the constriction of

the smooth muscle is not the main factor. Another significant point is that Dale produced these typical effects by the use of histamine, an animo-body, or in other words a split protein product. With the foregoing explanation, then, we can define "*anaphylaxis*", or as it is sometimes called "*Allergy*", after Von Pirquet, as a *state of hypersusceptibility of an animal towards a foreign protein to which it has been made sensitive by previous inoculation*. The anaphylactic shock is due to the meeting of the second dose of protein (antigen) with the specific antibodies set up by the first dose. The result is a splitting of the second dose into poisonous split products, which cause the characteristic reaction. The result is determined, we know not exactly how, by the tissue or organ affected. For instance, if the eyes and nose and throat are affected, the result is *hay fever*; if the bronchi, we get *asthma*; these are both due to inhalation of the poisonous protein. If ingested, the result may be *vomiting and diarrhoea*; while skin manifestations include *eczema, urticaria and angioneurotic oedema*. Dr. Freeman has placed these conditions under the inclusive term "the toxic idiopathies."

Chandler Walker divides asthma into two types: (1) typical bronchial asthma, to which the foregoing explanation applies. In this type the patients are protein sensitive, and therefore anaphylactic; and (2) atypical bronchial asthma, better called "asthmatic bronchitis." The primary cause of the latter type is bacterial infection, whether in the nose and throat, bronchial tubes, teeth, tonsils, sinuses, gall, bladder, or in any other site. Proteins are not the cause, so far as we can tell, unless it be a bacterial protein. It is not always a simple matter to distinguish between these two types, but as a rule the true asthmatic is usually free from symptoms between attacks; the dyspnoea is expiratory in type, and it is only towards the end of the attack that cough is at all marked. In asthmatic bronchitis on the other hand, the patient has usually had bronchitis for some time; there is cough from the start, and there may be fever. The dyspnoea is chiefly inspiratory, is increased by exertion, and some bronchitis still remains after the attack. In a large number of cases examined these two types were about equally divided.

The *technique* for determining protein sensitization is as follows: A series of small cuts which should not draw blood are made on the previously cleansed forearm. On these are placed a small amount of the protein to be tested and a drop of

tenth normal sodium hydrate to act as a solvent. After about half an hour, these drops are wiped off. A positive reaction is determined by the development of an urticarial wheal $\frac{1}{2}$ cm. or over in diameter, or a surrounding zone of erythema while the control remains negative. The proteins usually tested comprise (1) the epidermals or animal emanations, such as horse dandruff, cat hair, dog hair, sheep's wool, chicken feathers, etc.; (2) the pollens in patients suffering from seasonal hay fever or seasonal asthma, using those of timothy, red top, orchard grass, etc. for cases met with in spring and those of rag weed and golden rod for cases met with in autumn; (3) food proteins—this covers a wide range from soup to nuts, but the important thing is to test out the patient first with the various foods which he eats; (4) bacterial proteins—the reactions to these are not uncommonly delayed. In Walker's series of over six hundred cases, forty-eight per cent. were protein sensitive, and the remaining fifty two per cent. failed to give a reaction. Of the sensitive cases, one hundred were due to epidermal proteins, chiefly horse dander; seventy-four cases were due to foods, of which thirty-six were caused by cereals, the most important one being wheat, and thirty-eight were due to other foods such as egg, milk, potato, fish, etc.; sixty cases were due to bacterial proteins connected with the developments of the staphylococcus aureus, streptococcus hæmolyticus, staphylococcus albus and streptococcus viridans, mentioning them in the order of their frequency. In sixty-six cases, pollen protein was proved to be the cause of the bronchial asthma.

The age of onset of asthma in its relationship to sensitization is very important. In Walker's experience, four-fifths of those who began to have asthma in infancy were protein sensitive; in childhood, two-thirds; in young adult life, one-half; in adult life, one-quarter; and after fifty, none were sensitive. Half the epidermal cases began to have asthma before the age of ten years. Of the foods, egg, milk and the cereals are most commonly the cause in young children. The coexistence of eczema and asthma in children points to a food protein. Multiple sensitization, by which is meant the reaction to more than one protein, is more commonly met with in those in whom asthma began in childhood.

Of considerable importance also is the occupation of the individual, and in this connection could be discussed, had we space, the interesting question of acquired or latent hypersensitiveness, as in the case recently reported by Rosenbloom,

of a man forty-four years old, who had been a baker for twenty-six years, but had had asthma for only fourteen years, with an acute attack every second or fourth week. He was tested with one hundred and thirteen proteins, yet he gave positive reactions only to rye and wheat globulin. Jewel polishers sometimes develop symptoms from the orange-wood or box-wood with which they work.

In connection with acquired hypersensitivity, Schloss reports five cases of children who subsequently became sensitive to egg and lactalbumin, following attacks of enteritis, when presumably the damaged mucosa allowed the passage of the unaltered protein.

There is commonly a marked hereditary factor, and it is important to inquire into the family history for hay fever, eczema, urticaria, angioneurotic oedema, etc. In nearly half the total cases, such a history is obtainable. Cooke and Van der Veer say that what is transmitted is the capacity or tendency to form specific antibodies to any form of protein.

The treatment of the protein sensitive cases is on the whole gratifying. Walker claims that 75 per cent. to 82 per cent. were relieved. The food cases are probably best relieved by the withdrawal of the offending protein from the diet; desensitization by feeding the protein is a laborious and often an unsatisfactory procedure. Heat, how-

ever, will sometimes render the protein innocuous. The epidermal cases are readily desensitized by inoculation with gradually increasing doses of the protein dissolved in alkali. Practically, however, as for instance in a horse dander case, it is needless to desensitize a patient who fails to react to a weaker than one in a hundred dilution, as intimate contact would be required to cause symptoms in such a case. The pollen cases, and this applies particularly to hay fever, are treated by desensitization in the preseasonal period.

Of the nonsensitive cases, and the bulk of these are past middle age, treatment of the bronchitis by means of autogenous vaccines obtained from the sputum, often leads to amelioration of symptoms. At the same time, realizing that there are contributory causes of asthma such as climatic, hygienic, infective and psychic influences, these should be attended to, and focal infection and reflex causes should be sought for and removed wherever possible, and an attempt made to build up the patient's resistance.

REFERENCES:

1. ROLLESTON, SIR HUMPHREY: *Brit. Med. Jour.* 1921, 3, 231.
2. McNEIL, C.: *Edin. Med. Jour.*, 1921, 26, 188.
3. WALKER, CHANDLER: *Oxford Loose-leaf Medicine.*

Case Reports

TRAUMATIC ANEURYSM*

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Montreal

S. B., white, male, age 21 years, first came to the surgical outdoor clinic of the Montreal General Hospital in the afternoon of January 28, 1921. He had just stabbed himself with a butcher knife between the index finger and thumb of the left hand. The blood spurted several feet and he had had an esmarch applied. The wound, one inch

long, was closed by the house surgeon, Dr. H. F. H. Eberts, with two deeply placed silk worm gut sutures which controlled the arterial bleeding.

Six days later, as there was some redness of this area, the sutures were removed and evaporating lead lotion was applied. Five days later the hand was swollen and there was superficial fluctuation, which was incised after a saline bath.

On February 14th, seventeen days after the injury, he was offered to me for my clinic for third year students for that day on "acute infections," to be shown "before the abscess was incised"! My

first touch of the finger was surprised by a forcible pulsation.

The outdoor case card, S-1228-21, has recorded our findings at the clinic:

There is marked fullness on the dorsum of the left hand over the region between the first and second metacarpal bones. This is reddened, swollen, tender, with increased surface temperature and a visible arterial pulsation. Fluctuation is present. There is a raised area of redness $2\frac{1}{4}$ inches by $1\frac{3}{4}$ inches, over whose summit vertically is a linear scar $1\frac{1}{2}$ inches, slightly broadened at the upper extremity, from which sero-pus is exuding. A bruit was to be heard over this area. There was partial anæsthesia over the adjacent sides of the thumb and index finger and function of these was slightly impaired. Digital compression of the radial artery just above the wrist caused the pulsation to cease.

He was admitted to L service immediately and an esmarch attached to his bed and the ward nurses warned to watch for secondary hæmorrhage.

Next day, February 15th, under general anæsthesia, I tied off the radial artery by two ligatures of catgut, one-quarter inch apart, just above the wrist joint. The pulsation almost ceased in the aneurysm, but not entirely. The ulna artery was then exposed at the same level and on compressing it the pulsation ceased entirely. It was tied by a single ligature. It was noted that the capillary pulsation under the finger nails remained good.

Three days later he was discharged—both wounds were clean. The swelling was less, though some bloody pus was still discharging from the superficial abscess incised on February 8th. The hand was colder than the right, no anæsthetic areas were present, all movements were free. The capillary circulation was good, and there was some sweating of the hand. The colour was normal. There was no pulsation at the site of the aneurysm. He was referred back to the surgical outdoor, where on February 24th the sutures were removed. No pulsation was then to be felt. On the 24th of March he was re-examined in the surgical outdoor department. Both hands were equal in color, temperature and function. There was absolutely no pulsation at the site of the aneurysm. He had been working since about the 1st of March.

A SURGICAL CURIOSITY

G. W. T. FARISH, M.D.

Yarmouth, N.S.

I WOULD like to report to your Journal a surgical curiosity which occurred in my practice recently. I was called in consultation to see a case of Mrs. C. S., age 33, who had been suffering excruciating abdominal pain for twelve hours, with vomiting; the pulse was 96, and there was some tenderness over abdomen possibly more marked over McBurney's point. As she was under the influence of morphine when I saw her, the symptoms were somewhat masked and therefore difficult of diagnosis. She had a history of having been operated upon in September 1919 in a hospital in another town by a very skilful surgeon for some uterine condition. As she did not know definitely whether or not her appendix was removed it made the diagnosis more difficult. However, this rested between appendicitis and an obstructive condition of the intestines. The patient was thirty miles away, and I went prepared to operate if necessary. It was decided to open the abdomen and substantiate or otherwise our preoperative diagnosis. I found the appendix intact, and apparently healthy, but the small intestine was red, distended and œdematous, and upon seeking farther for the trouble, found in the small intestine somewhere, I should judge, between the jejunum and ileum a lump which filled the entire lumen of the gut, and which had the feeling of a ball of hardened feces. As it seemed to be the offending member I slit open the bowel, took out the lump on gauze, disposed of it on the floor and repaired intestine and closed abdomen. Upon investigation afterwards I found that the lump consisted of a bunch of hospital gauze about as large as a hen's egg, which when unfolded and spread out measured eleven by thirty inches. As I had never met such a condition before I was at a loss to know where that gauze came from. Several suggestions were made, viz., that in a fit of hysteria she ate it; another, that it was left in the abdominal cavity at the time of her first operation and had ulcerated through into the intestine, but there were no adhesions.

I would like some of the surgeons who may happen to see this to give me their version of the journey which this gauze made after it left the operating room.

Editorial

OUR JOURNAL

WITH the appearance of the last number of the Journal for 1921 the Editorial Board desire to call the attention of their readers to the difficulties under which both editors and publishers have laboured during the past six months owing to the continuance of a printers' strike in all the publishing offices of the Dominion. To this the diminished size of one number and the lateness of the appearance of other numbers during the past few months have been due. It is the hope of the publishers that most of these difficulties have been overcome, and that with the beginning of the New Year the *Journal* will once more make its appearance during the first week of each month. During the past few months, owing to the high price of paper and to the high wages demanded by printers, the cost of printing the *Journal* has very considerably exceeded the income received from the fee charged for membership in the Association. Notwithstanding the increase in cost and the consequent large indebtedness incurred by the Association, the Executive have acquiesced in the recommendation of the Editorial Board to an increase in the size of the *Journal*. For the first half of the last year this amounted to about fifty per cent., while in the past few months the number of reading pages has been almost doubled.

It is hoped that in the coming year the increased revenue which will arise from a larger membership in our Association as well as the increased fee to be charged for membership will permit the Editorial

Board to continue, and perhaps add to, the present amount of reading matter.

While the members of the Editorial Board feel that they can look back upon the various improvements that have taken place in our *Journal* during the past year with some pride, and also the consciousness of more earnest thought and energetic work expended in the preparation of each number, they are also well aware that there is still room for improvement before the *Journal* can take its place as a full and complete exponent of medical thought and medical affairs in the Dominion. To become such an exponent, we desire to publish papers that may prove of interest to the general profession, from every province of the Dominion, provided such papers present in a clear, concise and readable form the careful observations, the well-considered thoughts, and the interesting experiences of the writer on any subject in medicine. Such articles if short and concise will we are sure always be read by the earnest, but often busy practitioner. Long articles with many quotations from standard works are not only expensive to print, but as a rule are merely glanced at or skimmed over by the physician who has few spare minutes. Papers in some of the specialized departments in medicine and surgery will be published from time to time provided that they present facts of interest useful to the general practitioner. In our Retrospect Department we hope to place before our readers each month a review of one or more important subjects to which

much recent thought has been given or in which definite advances have been made.

We hope to be supplied regularly with all the recent news of the profession in each province, and in the department of abstracts from current literature we hope to supply our readers with the gist of all important current literature, European and American. In the effort to present in a monthly journal the medical thought and work of our Universities and Medical Societies throughout the Dominion, it is absolutely necessary that for the current

year papers so far as it is possible be *concise as well as clearly typed*, and for the present the Board muts reserve for itself the right to shorten or abbreviate papers exceeding 2500 words, provided such abbreviation can be made without detriment to the value of the article. This is a right, however, that will be exercised as seldom and as carefully as possible. In its work the Board hopes to have the sympathetic assistance of every province, and the support of every member of the profession in Canada.

OXYGEN THERAPY

THE successful administration of oxygen as a therapeutic agent has been a subject of debate for many years. Its technique and its results have always been open to question, and not until quite recently has the whole matter been taken up in a genuinely scientific way, with careful determinations of the blood gases.

In the last number of the *Archives of Internal Medicine*, Barach and Woodwell of Boston have presented a very lucid account of the subject. As is already well known, Barcroft shewed some years ago that any activity of the body organs involves a call for oxygen, and any increased work on the part of the heart, kidneys, muscles and secreting glands, can only be done with a proportional increase of oxygen consumption. As Haldane and others have shewn, the lack of oxygen is manifested by periodic breathing, impairment of the mental faculties (symptoms like alcoholic intoxication), an later, nausea, headache, vomiting and diarrhoea, and if the exposure has been

for a long time the symptoms may persist even after the cause has been removed. The pulse becomes rapid and feeble, the respirations shallower, with a final loss of consciousness, and progressive damage to organs. In those diseases where anoxæmia is a prominent factor, there is often increased metabolism, as has been shewn in cardiac insufficiency, and in fever.

Barcroft classified his types of anoxæmia under three headings:

1. *Anoxic Type.* The pressure of the arterial blood is too low. The arterial oxygen saturation of the hæmoglobin is below normal, *i.e.*, below 95 per cent. Mountain sickness is an example in which the diminished partial pressure of oxygen in the blood is due to the diminished partial pressure of oxygen in the atmosphere. In oedema of the lungs, the oxygen at prevailing pressures cannot diffuse properly through the diseased alveolar wall, and insufficiently oxygenated blood is passed into the aortic stream, lowering the arterial saturation.

2. *Stagnant Type.* The quantity of oxygen which reaches the tissues in unit of time is less than normal because of a slowed blood flow. More oxygen is used up in the capillaries and the venous blood has a lowered oxygen saturation, below 65 per cent.

3. *Anæmic Type.* A diminished amount of available hæmoglobin is present, which involves a lessened capacity to carry oxygen. This condition may be due to an actual diminution in the number of red blood cells, or the hæmoglobin may be converted into methæmoglobin, or monopolized by a carbon monoxid so that its oxygen-carrying function is destroyed.

As the Boston observers conclude, "The anoxic type is primarily due to pulmonary causes, *i.e.*, faulty oxygenation of blood as it flows through the lungs. The stagnant type is primarily due to cardiac causes, *i.e.*, decreased rate of blood through the systemic capillaries. In cardiac insufficiency, the two frequently occur together, the stagnant type because of poor heart action, the anoxic type because of the secondary conditions of pulmonary congestion and œdema.

The summary of their observations on cardiac insufficiency are succinctly added as follows:—

1. In a normal man, the inhalation of oxygen for one half hour caused an increase in the oxygen saturation of the arterial and venous blood. In a second normal individual, the inhalation of oxygen for the same period caused a very slight rise in the venous saturation, the arterial saturation not being tested. The pulse was slowed in both cases. No significant changes occurred in the blood pressure, vital capacity, electrocardiogram, venous carbon dioxid content, or rate of respiration.

2. In seven cases of cardiac insufficiency, an anoxic (arterial) anoxæmia was

present in all, a stagnant (venous) anoxæmia in all except one.

3. Oxygen inhalation regularly increased the arterial saturation. Where the anoxic anoxæmia seemed due to passive congestion and œdema at the bases of the lungs, the arterial saturation was raised to the normal by inhalation of oxygen for one half hour. In the cases complicated by widespread pulmonary œdema relief of arterial anoxæmia was accomplished in from forty-five minutes to two hours.

4. Oxygen inhalation increased the venous saturation in all except one case of auricular fibrillation. The elevation of the venous saturation was largely due to the raising of the arterial saturation. In a few cases, there was an additional and somewhat permanent increase in the venous saturation that seems best explained on the basis of an improved blood flow resulting from the increased supply of oxygen.

5. The arterial anoxæmia of acute and chronic bronchitis, and emphysema, occurring in cardiac insufficiency, was fully relieved by oxygen inhalation. The venous saturation was correspondingly elevated.

6. The relief of the cyanosis and the slowing of the pulse were the outstanding objective changes. The blood pressure, vital capacity, arterial and venous carbon dioxid content, urinary excretion, and rate of respiration showed no definite changes from short periods of oxygen inhalation. The electrocardiogram showed consistent changes in two cases of right bundle branch block but, no change in one uncomplicated case of auricular fibrillation. Subjectively, the patients usually said they felt more comfortable, or that their breathing was better, but they were rarely enthusiastic."

More interesting still are their observa-

tions on the anoxæmia in eleven cases of lobar *pneumonia*, and four patients with broncho-pneumonia. In some cases there was a true arterial anoxæmia, and in one other a stagnant anoxæmia. The most consistent changes in the clinical condition of the patient were the clearing of the cyanosis, and the slowing of the pulse. The respiratory rate was sometimes slowed, and the mental condition often improved. The dyspnoea, however, was not relieved. The effect of a single administration was as a rule temporary, while repeated and prolonged administration produced persistent beneficial changes in the oxygen saturation of the blood, in the pulse, the breathing, colour, comfort and mental condition. Where an acute oxygen want followed the development of pulmonary oedema, the prolonged administration of oxygen gave striking clinical improvement, and seemed to avert the fatal outcome. It is believed that oxygen therapy is a rational rule in the treatment of pneumonia, and that by their technique an effective method has been developed.

The technique of oxygen administration has until recently been most unsatisfactory, both from the point of view of dosage and of coordinated results. Haldane's face mask, and Ryle's nasal catheter, and Hill's oxygen bed tent, indicated the lines along which improvement was attempted. In the method of administration two factors were considered, first, to obtain an effective oxygen mixture, and secondly, that oxygen itself should not be given for too long a period. In any case it would seem that mixtures under 70 per cent. oxygen could be breathed indefinitely without harmful effect.

Barach and Woodwell in their investigations obtained most satisfactory results from the use of the soft rubber mouth-piece, as employed with the Benedict

respiration apparatus. It fits easily into the mouth, has a sufficiently wide opening for all respiratory excretions, and there is no leakage. The patient is asked to breathe through the mouth, and in the process it was found he breathed from four to seven parts of oxygen through his mouth, and from three to six parts of air through his nose. This mouth-piece was connected with a soda-lime canister, which, in turn, was attached to a rebreathing bag, and this in turn to an oxygen tank. By this means the patient rebreathed pure oxygen, for the carbon dioxide was re-absorbed by the soda-lime. It was found that patients took the mouth-piece well, that the breathing was satisfactory, and involved no burden.

Another feature of great interest in connection with these investigations is the observations that have been made upon uneven ventilation of the lungs resulting from shallow breathing, and consequent anoxæmia. For these observations patients with lethargic encephalitis were examined. In these patients there was an extreme type of shallow breathing, with deep cyanosis and coma. The arterial blood was markedly deficient in oxygen, and contained an excess of carbon dioxide.

The inhalation of oxygen greatly relieved the arterial anoxæmia, but had no effect upon the steady accumulation of carbon dioxide. While the circulation was strikingly improved in the beginning, as the result of the relief of the anoxæmia, later on progressive cardiac failure occurred, apparently related to the carbon dioxide retention.

It seemed probable to these observers that a terminal involvement of the respiratory centre in lethargic encephalitis is, at times, the cause of death.

ON THE LOWERING OF BODY RESISTANCE FOLLOWING EXPOSURE TO COLD

THE belief has long been held by clinicians and investigators that when the surface of the body is chilled certain of the internal organs, particularly the respiratory organs, become more susceptible to bacterial invasion. A few, however, believe that exposure to lowered temperature, of and by itself, may be an effectual cause of disease without the intermediation of bacteria. To assist in the further elucidation of this matter a careful series of experiments in which animals were subjected to sudden and severe lowered temperature for varying periods of time has been carried out by Lewis B. Bibb of the U.S. Army, and the effects produced in the various organs of the body have been carefully noted (*Am. Jour. Med. Sci.*, August, 1921). In these experiments rabbits were subjected to generalized cold in the form of an ice bath 1° C., and localized cold produced by the application of CO₂ snow. During and after the application blood pressure trac-

ings were taken, blood counts were made and the urine was examined at regular intervals. The animals were killed either immediately after the bath, or at definite intervals, and careful autopsies were made. The outstanding fact pervading the results as observed by them was the intensity of the vasomotor reactions set up by the ice bath and their universal distribution over the body. Small hæmorrhages were found in the tissues of many organs, but were especially numerous in the lungs and stomach. Blood distribution was found altered in the lungs, skin, tracheal mucosa, stomach, spleen, and in some cases in the kidneys. A leucopenia followed by a leucocytosis was induced in the peripheral blood. Bibb considers the increased susceptibility to bacterial invasion noted after chilling of the surface of the body as due to the disorganization of the normal defences of the body produced by the vasomotor disturbances.

ANÆSTHESIA IN NOSE AND THROAT WORK

SOME months ago the attention of our readers was called to the first report of a Committee appointed by the section on Laryngology, Otology and Rhinology of the American Medical Association to study the advantages and disadvantages of the various local anæsthetics in use at present in nose and throat work. In a recent number of the *Journal of the Am-*

erican Medical Association, October 22, 1921, a final report is presented, which will be read with interest by the profession in Canada. Fourteen hundred letters were sent out by the Committee to members of this section of the Association, and three hundred and fifteen replies were received. Twenty-seven deaths were reported in which the local anæ-

thetic was the direct cause of the fatal issue. Of five no details were obtainable. Of the remaining twenty-two, eleven were from cocain, five from procain and cocain, three from procain only, one from apothecin and cocain, one from apothecin only, and one from alypin and cocain. All of these fatalities have occurred within the last two or three years, and with the exception of three none have been reported in the medical journals. The Committee sum up their report on what they found as follows:

A study of these untoward happenings enable us to reach the following conclusions:

1. Deaths from the administration of local anæsthetics are vastly in excess of the number reported in the medical journals.

2. In most instances convulsions are the first indication of toxic effects; con-

sciousness is never regained and death ensues within a comparatively short time.

3. The customary dosage of local anæsthetics varies from small amounts to very large ones.

4. There is no check on the manufacturer as to the comparative toxicity of the various batches of drugs that are placed on the market.

5. The freedom from ill effects noticed by many who have used these drugs has made the profession oblivious to the presence of danger.

6. The presumption of the Therapeutic Research Committee, that there are many unrecorded deaths, is thoroughly substantiated.

7. The appointment of a suitable commission to investigate further these deaths and take action thereon is vitally necessary.

NATIONAL BOARD OF MEDICAL EXAMINERS IN UNITED STATES

IT will be a source of gratification to all recent graduates of our universities in Canada to know that a National Board of Medical Examiners for the United States are prepared to examine and grant a license to practice to such graduates of Canadian Medical Schools rated as Class A who pass this examination. Those who are successful are to be awarded the privilege of practising without further ceremony in most of the States of the American Union. The sub-joined statement from the National Board indicates the nature of the examination. Certainly it is a gratifying piece of news to learn that the restricted conditions that exist

in so many of the States of the Union are now to be removed through the agency of one National Board, acting very much in the same capacity as does the Dominion Medical Council for our own country.

The following statement, issued by the National Board, is herewith appended:—

The National Board of Medical Examiners has just completed the first five years' work and with it the trial period of its usefulness. The principle which this Board has stood for, namely, the establishment of a thorough test of fitness to practice medicine and surgery which might safely be accepted throughout this country and abroad, has been widely accepted.

Since this Board was organized by Dr. W. L. Rodman in 1915, eleven examinations have been held. These examinations have been conducted on the plan of holding at one sitting a written, practical and clinical test for candidates possessing proper qualifications, viz., a high school training, two years of college work in arts and science, and graduation from a class A Medical School, together with one year's internship in an acceptable hospital. These examinations have covered all the subjects of the Medical School curriculum and have been conducted by members of the National Board associated with members of the profession resident in the place of examination appointed to help them.

Starting with the endorsement of the Council on Medical Education of the American Medical Association, the American Medical College Association and various sectional medical societies, its certificate is now recognized by the Army, Navy and Public Health Service Medical Corps of the United States and by twenty states in the Union, also by the Conjoint Board of England, the Triple Qualification Board of Scotland, the American College of Surgeons, and the Mayo Foundation of the University of Minnesota.

In order to help the Board the Carnegie Foundation has appropriated \$100,000.00 over a period of five years.

REGARDING THERAPEUTIC ADVERTISEMENTS

THE Editorial Board of the Journal regrets that through some misunderstanding, reading notices in the October issue, intended only for insertion as ad-

vertisements, were allowed to be inserted on pages wholly reserved for reading matter which has been edited by the Board.

WE desire to call attention to the advertisement in our current issue of the Purchasing Commission of Canada, who have for disposal Government surplus stores of surgical instruments, appliances

etc., and also some medicines. The Government is very anxious to dispose of these stocks, and physicians may find it of advantage to obtain a copy of the list, which will be mailed on request.

Correspondence

Halifax, N.S.,

November 2, 1921.

To the Editor:

If, as you say, in your criticism of my presidential address, I "belittled the study of physics, chemistry and biochemistry," what do you infer from the paragraph beginning with:

"But I would not be misunderstood. Let our universities by all means cover the whole field of medical science, yet I would not add to that the ability to weigh the moon in physics" etc. etc.

To make my meaning clear, let us take an analogous case in medicine: An ataxic patient with sclerosis somewhere along the course of his posterior columns. His muscular power remains good, but he does not know how to use it. He lacks co-ordination. Do I as a clinical teacher belittle muscular power, because I point out its errancy? Lack of co-ordination in medical education due to sclerosis somewhere in the spines of the institutions entrusted with it! That was and is my charge, and I am quite prepared to stand by it.

Nor am I alone in this attitude. Dr. Hugh Cabot must have had some of it, when, in his address published side by side with mine, he said: "Today we are exceedingly dependent upon the results of laboratory investigation . . . It sometimes occurs to me to think that we at times lose our sense of proportion (ataxia pure and simple) and become altogether too dependent upon our laboratory associates, and at times rely too implicitly upon their results."

Frank Kidd, M.B., F.R.C.S., Eng. surgeon to

London Hospital, in his book *Common Infections of the Kidney*, which I believe is the most scientific book on the subject in our language, and which I have read since my address, has this to say, p. 165:

"A school of bacteriologists has grown up apart from the wards, who might perhaps call themselves the sterilizing school, but which I would prefer to call the Sterile School. Their observations lead them into a blind alley, when they forget the human being, in their intense study of the bacterium. They develop the *test-tube mind*." And on p. 199 he says: "It has lately been the fashion to despise clinical medicine, and to deny to clinical observation the blessed title of 'Research.' The future, I believe, lies far more with real clinical research than with pure laboratory research."

Do these men—these great men—belittle the subjects of physics, chemistry, or bacteriology, because they lament and denounce the modern failure to adapt and conform any one of these subjects to sound clinical education? If my long experience in clinical teaching, and my recent observation, has forced me unknowingly into the company of these, and many other such worthies why should you express any regrets about it? We need many things, but none more so than men—men able to adequately co-ordinate the course of instruction so that our students shall not emerge from our hospitals cursing, as I heard them do, "the academic alphabets who robbed them of clinical experience."

Sincerely yours,

M. CHISHOLM

Obituary

DR. WALTER H. MOOREHOUSE

Dr. Moorehouse died at his residence in London, Ont., on October 24th. He had practised medicine for half a century, and was universally regarded as a capable and conscientious physician known and respected through all the western counties of Ontario. He was born in the county of Lambton, and was graduated in 1874 from the University of Toronto, with the degree of M.B. For a time he did post-graduate work in England, and, returning to Canada, secured the degree of

B.A. from the Western University, London. Dr. Moorehouse had been for seventeen years Dean of the Western Medical College, and was for eight years Vice-Chancellor of the University. He was past President of the London Medical Association, the Ontario Medical Association, and the Canadian Medical Association. He had also been a member of the Senate of Huron College, and a warden of St. Paul's Cathedral. He is survived by his wife. J. Hopkins Moorehouse of Winnipeg, a well-known Canadian author, is a nephew.

Abstracts from Current Literature

SURGERY

The Treatment of Joint Tuberculosis. ELY, LEONARD W.: Amer. Jour. Surg., Vol. 35, No. 9.

ATTENTION is first called to the wide divergence of methods used, and ignorance of the pathological condition is suggested in explanation for this divergence.

The writer then notes that "tuberculosis of a joint is the same in its essence as tuberculosis in any other part of the body," and that it is a disease strictly limited to two tissues, lymphoid marrow and synovial membrane. Hence the explanation of the fact that long bones are attacked only in the neighbourhood of a joint, instead of in the shaft.

Hence rules of treatment are:—

1. Deprive the joint of function—in children by conservative methods, and in adults by radical operation.

2. Avoid secondary infection, closing all wounds without drainage. "When we attempt to provide by drainage for the exit of tuberculous material, we really provide for the entrance of pus germs, and often open the door through which death eventually enters."

3. Improve the patient's general condition by rest, good food and fresh air.

4. Cold abscesses, if deep seated, not increasing rapidly in size and not approaching the surface, may be left alone. Otherwise they should be aspirated under the strictest aseptic precautions. In no case are they to be opened or drained.

An opinion is not expressed as to the benefit or otherwise of injecting pus cavities with antiseptics.

5. In excising joints do not attempt to remove all the disease. Simply take away enough bone to destroy the joint.

The author then goes on to discuss the operations advisable in each locality, and concludes by stating that operation is almost invariably the best treatment for a tuberculous spine in patients of all ages, claiming that conservative treatment rarely results in a cure, and almost invariably is accompanied by deformity.

This article is clear and concise and is worth reading.

W. J. PATTERSON

The Simplification of Technique in Operations for Harelip and Cleft Palate. THOMPSON, J. E.: Annals Surg., October, 1921, Vol. 74, No. 4.

THE author states that whatever be the cause of the failure of the embryonic face fissures to unite, the subsequent deformity is not due to the lack of development of the lateral halves of the palate or the alveolar border, but to the thrust of the muscular tongue distorting these parts if they have failed to unite at the proper time. The alveolar processes are thrust outwards, and the palatal processes upwards. The deformity cannot be overcome by bringing the alveolar margins together as is indicated in Brophy's description of his operation. The measurement of the degree of deformity is made by taking the width of the upper jaw in comparison with the lower at corresponding points. The author insists that a correction of the bony deformity must precede the correction of the lip. He divides his procedure into two, three or even four stages. The first stage consists of the moulding and suturing together of the alveolar borders. This can be done with the fingers up to the age of three months. The lip may then be closed either at once or at the second stage. The third stage is the closure of the palatal cleft. This also may have to be divided into two steps. The work should be completed before the child has learned to talk. The alveolar border and the lip are operated on as early as possible. The closure of the cleft in the palate is deferred till the child is six months old or until even later. A double complete cleft is rarely finally restored before the end of the second year.

F. A. C. SCRIMGER

Subluxation of the Shoulder Downwards
COTTON, FREDERICK J.: Boston Med. and Surg. Jour., Vol. 185, No. 141.

THE author states that so far he has not found any thing written on this condition, which he describes as due not to a single trauma, but a result of gradual exhaustion of the shoulder muscles, par-

ticularly the deltoid. He believes that many cases listed as circumflex nerve paralysis properly belong to this group.

A typical case is described as a result of an uncomplicated fracture of the humerus treated by traction, especially if the muscles are none too strong.

If untreated the condition passes on to one of helplessness and stiffness, not unlike that of subdeltoid bursitis.

Treatment should consist of early massage, and as soon as possible, the exchange of traction for support of the whole arm.

The condition is most likely to occur in the elderly, the stout, and the less vigorous.

W. J. PATTERSON

The Injection of Oxygen Into Joints for Diagnosis. KLEINBURG, S.: *Amer. Jour. Surg.*, Vol. 35, No. 9.

THE history of the development of this is reviewed, and several cases are cited from the author's personal experience.

The conclusions drawn are:—

1. The practicability of injecting oxygen in an out-patient department has been demonstrated, at least in non-weight bearing parts.
2. The subdeltoid bursa can be injected and its outlines shown without difficulty or pain.
3. The method has not been successful in outlining loose or injured semi-lunar cartilages in knee joints.
4. The method accentuates the contrasts between soft parts and bony parts, and brings into relief soft parts not seen in ordinary radiograms.
5. It is very useful in demonstrating loose bodies in joints, and invaluable in localizing them.
6. It is helpful in showing the presence and extent of hypertrophied synovial tissues.

W. J. PATTERSON

Arthroplasty. PUTTI, V.: *Jour. Orthop. Surg.*, September, 1921.

AT the May meeting of the American Orthopaedic Association in Boston, Professor Putti outlined his technique in arthroplasty, particularly for bony ankylosis of the knee. He showed moving pictures of the end results, which were excellent. He maintains after ten years' experience that arthroplasty is an interference worthy of the greatest faith and destined to assure a real functional advantage to the patient. He insists however that it must not be lightly undertaken or proposed.

The surgeon should have a notable mastery of technique, and the patient should be willing to undergo much suffering in the post-operative manipulation of the joint. Free fascia flaps are used, the ends of both bones being completely covered.

Professor Putti's end results mark an epoch in the history of arthroplasty.

J. A. NUTTER

Arthrodesis of the Sacro-Iliac-Joint—A New Method of Approach. SMITH-PETERSON, M. N. *Jour. Orthop. Surg.*, August, 1921.

DR. SMITH-PETERSON's approach to the hip joint, which has been found so useful, has stimulated him to the perfecting of a similar subperiosteal approach to the sacro-iliac joint.

This article, which is well illustrated, makes his technique plain. A subperiosteal flap is thrown downwards and forwards exposing the posterior part of the bone. A rectangular window is chiseled through this bone and removed en bloc. The sacro-iliac joint is come upon. In cases of tuberculosis and relaxation the cartilage and cortex of the sacrum are removed and the block of bone from the ilium driven part way into the sacrum, thus obtaining bony union.

In purulent affections the window is left open for drainage. The results are stated to be excellent in all three conditions mentioned.

J. A. NUTTER

Manipulations of Stiff Joints. JONES, SIR ROBERT.: *Jour. Orthop. Surg.*, August, 1921, p. 385.

WHEN is a stiff joint to be moved and when is it to be rested? The answer depends on the absence or presence of arthritis. In arthritis a joint should show rigidity in all directions, not in certain directions only. No limitation of joint movement means no arthritis. Joint adhesions are to be avoided by early and safe resort to active and passive motion. In direct injuries to joints unaccompanied by fracture, movement may be given immediately on the cessation of acute symptoms, i.e., when swelling and tension pain have disappeared.

The technique of breaking down of adhesions is described in the case of every joint. Early movements after manipulation are advised. The tearing or feeling of an adhesion rupturing gives a good prognosis, but when the joint yields slowly and gradually the prognosis is not so good.

Subacute arthritis of the shoulder following a fall with outstretched hand is described as due to

stubbing the shoulder. The stiff elbow joint, especially in children, often becomes mobile by use, even where passive motion causes a painful reaction. The benefit resulting from manipulating under an anæsthetic a monoarticular osteoarthritis of the hip is noted. The symptoms and treatment of adhesions about the insertion of the ligamentum patellæ of an incompletely reduced semilunar cartilage, and of adhesions between semilunar cartilage and joint capsule, are described most clearly.

In the foot the disability resulting from adhesions is discussed, with the appropriate remedy.

A most instructive and practical article.

J. A. NUTTER

MEDICINE

Restoration of the Normal Cardiac Mechanism in Auricular Fibrillation by Quinidin.

LEVY, ROBERT L.: Jour. A.M.A., Vol. 76, May 7, 1921.

FOLLOWING the earlier work of Wenckebach in 1914 with quinin in auricular fibrillation, Frey in 1918 and subsequently other continental workers used quinidin, a dextrorotatory stereo-isomer of quinin, with somewhat better success.

Levy gives a preliminary report on his results with quinidin in four cases of fibrillation.

With preliminary trial doses of 0.2 to 0.4 gm. of quinidin and subsequent larger doses aggregating 4.8 gm. as the maximum, he has been able to reduce well-established auricular fibrillation to a normal regular rhythm in two of his cases, without any alarming symptoms following its use.

In the two successful cases the transition from one rhythm to the other was by means of a transitory auricular flutter.

The third case changed to auricular flutter, then back to fibrillation. The last patient, beyond a transitory tachycardia, remained in fibrillation.

The determining factor in altering the mechanism of the heart is not clear.

To achieve optimal results it would seem best to administer the maximum dosage, compatible with safety, in as short a period of time as possible.

C. F. MOFFATT

Visceroptosis as a Cause of Stomach Trouble.

REID, W. D.: Boston Med. and Surg. Jour., June 16, 1921.

Medical Aspects of Visceroptosis. EBRIGHT, California State Jour. Med., June, 1921.

The Interpretation of Gastro-Intestinal Signs and Symptoms. ROLPH, New York State Jour. Med., July, 1921.

THESE articles on visceroptosis draw our attention to an important subject and remind us of the many forms which it may assume.

Reid says his paper was written to draw attention to the condition, not to point out anything new., as he is continually seeing patients suffering from visceroptosis who have been treated for many other things. He cites several cases; all were women, and all came to him as stomach cases. They were people of poor physical development and as he says "they carried themselves in the posture of fatigue." He made his diagnosis on the history and clinical examination and by the ruling out of organic disease by means of x-rays and laboratory tests.

Ebright recognizes two types, an hereditary and an acquired. The hereditary type, as he pictures it, is familiar to us all; a long flat thorax, unattached ninth and tenth ribs, unstable vasomotor system and a low blood pressure, that is the opposite to the athletic type. The acquired type follows a chronic illness, pregnancy, or a too strenuous reduction of weight.

The treatment of the hereditary type should begin in early life, and last through the school years, and this should be the work of the family physician. For the fully developed condition treatment should be along two lines, the increasing of nutrition, and the correcting of mechanical faults. Stress is laid on the importance of attending to foci of infection, and sources of irritation, as weak ankles and flat feet, and Reid believes the condition should be explained to the patients, which encourages them, as they usually have been considered lazy or "quitters." Nutrition is increased by avoiding fatigue and taking plenty of good food daily. This food is best taken in small quantities and carbohydrates are better borne than fats. They recommend reclining after meals in positions that prevent drag, such as on the back with a pillow under the hips, or prone with a pillow under the lower abdomen. As regards mechanical support of the organs, bandages or well-fitting corsets may be used, but Ebright advocates the use of suitable exercises combined with massage and hydrotherapy.

Rolph in his paper has endeavoured to link up some of the complaints of gastro-intestinal patients with their causes. He considers a number of them. Hæmorrhage, he thinks, is more often due to a ruptured vein, from congestion the result

of spasm, than from ulceration, and pain and tenderness are not the result of mucosal irritation but of the distension of unstriated muscle. Duodenal spasm and hyperperistalsis are the causes of hunger pain. When the stomach is empty a normal duodenal contraction may become a spasm where we have an irritable vagus nerve, and gastric peristalsis then causes pyloric distension and pain. So duodenal ulcer symptoms are the symptoms of duodenal spasm, and these may be caused reflexly from a diseased appendix, gall bladder, throat etc. The ulceration is probably due to spasm and is an accidental happening, and does not give rise to any particular symptoms, except perhaps it increases the local spasm and causes hæmorrhage and peritoneal irritation. Gastro-enterostomy relieves the hunger pain by providing a safety valve and also preventing distension and muscle stretching.

R. H. M. HARDISTY

Smallpox Vaccination and Pulmonary Tuberculosis. KLOTZ, WALTER C., and STAFFORD, FRANK B., *Amer. Rev. of Tuberc.*, September, 1921, Vol. 5, page 595.

THIS report is the result of the experience of the authors when faced with the danger of a smallpox epidemic in a sanitarium. There were 133 patients in the sanitarium, of whom 21 had never been vaccinated: all except 20 who were too ill were vaccinated.

All patients were given a routine examination before vaccination, were kept in bed during the active manifestations of vaccinia, and were given a special and careful examination after all evidences of reaction had subsided. In only one of them was there an increase in the number of râles, but this patient had been progressing unfavourably

for some time previously: indeed most of them declared that they felt better than before vaccination. In a group of 19 employees the symptoms of vaccinia were as severe as in the patients with active tuberculosis. The stage of the tuberculous process had no effect on the vaccinia. The authors conclude that vaccination is not contra-indicated in tuberculosis and does not exert any unfavourable influence upon it.

D. G. CAMPBELL

On the Etiology of Hæmorrhagic Disease of the New Born. GELSTON, C.F., *Amer. Jour. Dis. of Chil.*, Vol. 22, No. 4.

THE paper is a clear statement of the present-day belief in regard to the etiology and treatment of hæmorrhagic disease in the new born. One case is reported in detail. After a short historical sketch, the author states that the work of Hurwitz and Lucas has placed the subject on a firm physiological basis. They are stated to have proved that the bleeding of hæmophilia is due to the lack of prothrombin, with a consequent disturbance of the prothrombin antithrombin balance. Prothrombin is known to be lacking also in cases of hæmorrhage of the new born, as has been shown by Whipple and others. The treatment in the case reported, and the treatment recommended is the injection of whole blood into the muscle and into the superior longitudinal sinus. In the author's case ten cc. of citrated blood was injected into the buttock, followed by eight cc. into the longitudinal sinus, and one-half hour later thirty-five cc. into the same sinus. The bleeding ceased and did not recur. The coagulation time of the blood changed from seventy minutes to eighteen minutes. It is to be noted that citrated blood was used.

F. A. C. SCRIMGER

CANADIAN ARMY MEDICAL CORPS

RE-ORGANIZATION

AT the present time, three years after the signing of the Armistice and nearly one year since the closing of the last C.E.F. hospital and the demobilization of its personnel, the work of re-organizing the Militia Medical Service is making good progress. During the transition period from C.E.F. activities to peace-time conditions, when many medical officers upon demobilization were immediately confronted with the serious problem of re-establishment, it was impossible to infuse the same enthusiasm for military associations as during the war. However, since the new establishment of medical units was authorized late in the year 1920, approximately 700 medical officers have been appointed to medical units, or attached as Regimental Medical Officers to non-medical units. This fact, in itself, is proof positive that the spirit of self-sacrifice so markedly displayed by the medical profession during the war still survives, and augurs well for the success of the re-organization of the Canadian Army Medical Corps.

In pre-war days the medical organization of the active militia provided for a certain number of cavalry field ambulances, field ambulances and clearing hospitals, but no provision was made for general hospitals, stationary hospitals, nor for the smaller units which during the war were found to be so necessary. In the new organization provision has been made for a certain number of all medical units which served overseas, and in considering the numbers of these units to be retained in the militia upon re-organization, a definite plan was followed. In locating units, every consideration was given to territorial, university or provincial associations, while in each case the overseas number has been retained. In many of the new militia units the Overseas Commanding Officer has again taken command; in others, officers who were closely identified with the unit overseas still retain their connection. Moreover, in nearly all cases units have been located in areas from which recruits were drawn during the war, thus making it possible to a great extent to continue war associations.

Before and during the war, seniority in the Army Medical Corps was by a corps list. This was possible previous to 1914, but during the war great difficulty was experienced in maintaining relative seniority among the great number of medical officers both overseas and in Canada. In the re-organization, very careful consideration has been given to the matter of seniority among officers, upon being appointed to the Non-Permanent Active Militia. Seniority by a corps list for the whole of Canada was not considered feasible for obvious reasons, and has, therefore, been discontinued. The following scheme of re-organization has been recently authorized, and it is hoped will prove generally satisfactory:

The Medical Service of the Canadian Militia, (Non-Permanent) to consist of:—

- (a) The Canadian Army Medical Corps, including the Nursing Services.
- (b) Regimental Medical Services, as at present existing.

(a) *Canadian Army Medical Corps*

(1) Regimental lists for C.A.M.C. Units—i.e., each general hospital, cavalry field ambulance, field ambulance or other medical unit, except the sanitary sections which have only one officer, to have a seniority list of its own. The officers to be promoted in their own unit without regard to seniority on the general list, C.A.M.C. The officers to command sanitary sections to be drawn from the general list, C.A.M.C.

(2) General list, C.A.M.C., to include all officers attached to non-medical units as Regimental Medical Officers, and approximately 100 other officers not regimentally employed. This general C.A.M.C. list to have an establishment of, approximately:

Colonels and Lieutenant-Colonels . . . 30

Majors 75

Captains and Lieutenants 195

Officers to be interchangeable between the general and regimental lists.

(3) Corps or Unit Reserves. Each medical unit to have a Corps Reserve, which will be governed by the regulations as laid down

for similar reserves of the cavalry, infantry, etc.

(4) Nursing Services. List of nursing sisters to be published by units in districts.

(b) *Regimental Medical Services.*

The Regimental Medical Services consist of certain medical officers now under 60 in number, who were appointed prior to 1909 to Regiments of Cavalry, Battalions of Infantry, etc., and who are medical officers of their units but do not belong to the C.A.M.C. Officers under this category to be allowed to remain with their present standing, but no new appointments to be made and no more promotions from the rank of Major to the rank of Lieutenant-Colonel, except when the officer is placed on the reserve of officers,

C.M., in accordance with Para. 211, K.R. & O., Canada, 1917, and Para. 193, K.R. & O. Canada, 1917.

The scheme of re-organization as outlined above, when applied in appointing officers to the medical units, as well as to the non-medical units as Regimental Medical Officers, will make it possible for nearly 2,000 of the 3,000 Canadian doctors who had service either with the C.A.M.C. or the R.A.M.C. during the war, to continue their associations with the Militia, either on the Active List or on the Reserves of Medical Units.

A complete list of medical units authorized, together with the complement of officers appointed thereto, appears in the Militia Gazette.

RESOLUTION PASSED AT RECENT DOMINION CONVENTION OF AMPUTATIONS

WE, the Amputations' Association of the Great War, assembled in their first Annual Convention, this 29th day of September, 1921, on this memorable occasion earnestly desires to express their gratitude and thanks to the various Medical Services with whom we have come in contact, for their perseverance with us, their skill, and above all for the kindness shown to us.

And we also earnestly desire to convey our deep, and sincere regard to the Canadian Red Cross, the Y.M.C.A., the K. of C. Army Huts, the Salvation Army and all other organizations who laboured so much for our comrades and ourselves during the late war to make life a little more cheerful.

And to our comrades, the Nursing Sisters, we wish to express our humble appreciation for so heroically befriending us in time of need.

And to the Governments of Canada, Federal and Provincial and Municipal, we extend our thanks for their deliberations on our behalf.

And to the Churches of all denominations we wish to convey our gratitude for their prayers on our behalf.

And we do earnestly thank the people of Canada for the splendid way they have stood behind us on all occasions, for their unselfish support and their boundless sympathy to us.

News Items

GENERAL

THE tenth International Congress of Otolaryngology will meet in Paris in July, 1922, in the week preceding the meeting of the British Medical Association. The Organizing Committee for the British Empire has, as its President Dr. Urban Pritchard, Sir St. Clair Thomson being chairman of the Committee, and Mr. Lionel Colledge (22 Queen Anne Street, London, W.I.) and Mr. J. S. Fraser (Edinburgh) being the Honorary Secretaries. On this Committee Sir James Barrett is the representative for Australasia and Dr. H. S. Birkett there representative for Canada.

The British Committee of Organization has already received no less than 100 adhesions. Those who may not have received a direct invitation are requested to communicate with the Secretary, sending their subscription of ten shillings. All who join the British Committee will be kept informed of details and arrangements for the Congress as they develop. Although the Congress remains in name one of Otolaryngology, it will practically embrace both Rhinology and Laryngology.

DR. ROBERT W. POWELL, Registrar of the Medical Council of Canada, announces the results of the October examinations held at Montreal for

registration under the Canada Medical Act. The successful candidates, arranged alphabetically, are as follows: E. C. Brown, Montreal; E. M. Busby, Ottawa, Ont.; J. R. Calder, Lachute, Que.; W. J. Cochrane, Victoria, B.C.; E. Craig, North Gower, Ont.; W. L. Crewson, Alexandria, Ont.; C. L. Derick, Noyan, Que.; J. B. Dickie, Truro, N.S.; J. L. Duffy, London, Ont.; W. W. Eakin, Westmount, Que.; A. B. Hawthorne, Westmount, Que.; P. Heinbecker, Listowel, Ont.; S. A. Holling, Ottawa, Ont.; H. S. Hooper, Brownsburg, Que.; W. D. Jamieson, Brantford, Ont.; M. Kaufman, Montreal; D. R. Learoyd, Ottawa, Ont.; J. R. Lockhart, Bristol, N.B.; C. P. McCabe, Pictou, N.S.; L. E. McCaffrey, Ormstown, Que.; S. R. McCreary, Toronto, Ont.; E. A. McCusker, Regina, Sask.; A. M. McGillivray, Dalkeith, Ont.; P. McIntyre, Montague, P.E.I.; H. D. Morse, Halifax, N.S.; V. P. Norman, England; J. W. Palmer, Gagetown, N.B.; W. A. Porter, Yarmouth, N.S.; W. deM. Scriver, Montreal; H. B. Smith, Gloversville, N.Y.; J. W. Towlen, Detroit, U.S.A.; O. C. Trainor, Charlottetown, P.E.I.; H. S. Trefry, Yarmouth, N.S.; J. B. Valentine, Ottawa, Ont.; H. S. Whiting, Westmount, Que.; A. W. Young, Revelstoke, B.C.; M. A. Young, Edmonton, Alta.

NEW BRUNSWICK

UNDER the title of "Prevention," the Department of Health in New Brunswick has issued a small pamphlet in which it proposes to carry on a campaign of education in public health, and to

supply such information to the public as may lead them to estimate the great value of preventive medicine.

QUEBEC

ONLY a few years ago it was a rare event when a surgeon from England or the Continent came across to the New World on a voyage of exploration. The current was very much the other way. But now the stream appears to be setting toward

this side. Europe visits America and finds much to learn in matters surgical. Montreal and Toronto are finding occasion more and more frequently to welcome distinguished visitors from the other side. During September Professor de Quervain,

the successor to Kocher at Berne University, accompanied by Dr. d'Houbler of the Augustana Hospital, Chicago, included Toronto and Montreal in his tour. Apart from the prime object of his visit, which was to give an address on thyroid surgery at the Philadelphia meeting of the American College of Surgeons, he was collecting ideas for the construction of a new surgical clinic at Berne. With this object in view he visited the Montreal General and the Royal Victoria Hospital, and also the Hotel Dieu, in Montreal, and was afterwards tendered a dinner by the surgeons of these institutions.

ARRANGEMENTS are now under way for the formation of a provincial medical association for the province of Quebec. An inaugural meeting will take place on Monday, December 5th, and it is

expected that the first regular meeting will be held some time during the month of January. It is expected that this organization will bring together the French and English members of the profession, and that conjoint clinics will be held in the larger French and English hospitals in Montreal, Quebec, and also under the auspices of some of the county societies.

In response to requests from some of the graduates in medicine in Montreal, the attending physicians of the Children's Memorial Hospital have arranged to give a series of clinics this winter illustrating the more important subjects in Pediatrics. These clinics will be at least twenty in number and will be held in the Hospital twice a week on Tuesday and Friday afternoons from 5 to 6 p.m., commencing on November 22nd.

ONTARIO

DURING the week of October 30th to November 5th, "National Cancer Week," the American Association for the Control of Cancer had asked the profession in Canada to co-operate in a movement to spread abroad some truths with regard to this nation-wide scourge. In response to their request, the Academy of Medicine, Toronto, arranged that a stated meeting scheduled for February, 1922, should take place during the week. This meeting, the main feature of the week's activities, was addressed by Dr. Alexander Primrose, introducing an outline of the work of the American Association for the Control of Cancer.

Following Dr. Primrose's introduction, the "Progress of Cancer Treatment" was detailed by Dr. Harvey R. Gaylord and Dr. B. F. Schreiner of the New York State Institute for the Study of Malignant Disease.

THE sections of Obstetrics, Gynæcology and Pediatrics held their joint meeting at the Academy on November 3rd.

ON November 7th, Lieut.-Col. Robert McCarrison, F.R.C.P., of the Indian Medical Service, addressed a special meeting of the Academy, the subject being "Recent Investigations Into the Relationship Between Diet and the Condition of the Thyroid Gland."

ON November 8th, the joint meeting of the Sections of Medicine and Pathology took place at the Academy of Medicine, the subject "Encephalitis" was discussed from various standpoints, points, Professor Boyd of the University of Manitoba introducing the pathological and clinical side of the disease. The experimental work as followed in Toronto and the features of the disease as seen in this province were described by Drs. Gordon Cameron and Goldwin Howland.

THE Section of Ophthalmology and Oto-Laryngology met on Monday, November 14th. The report of cases operated on in Toronto and Hamilton by Colonel Smith, I.M.S., was given by Drs. R. J. P. McCullough and P. B. MacFarlane respectively. Modifications of the Indian operation were described by Dr. C. E. Hill.

THE Section of Surgery of the Academy of Medicine met on November 15th.

THE Section of State Medicine of the Academy met on Tuesday, November 29th, at 8.30 p.m. The following programme was presented: 1. Chairman's address, "Health Propaganda." 2. "Health in Industry and its Relation to the Community," J. G. Cunningham (By invitation).

Discussion led by Herbert Baker. 3. "The Value of Quarantine in Communicable Disease," J. J. Middleton. Discussion led by A. Grant Fleming. J. T. Phair, Chairman, Ruggles George, Secretary.

THE Chairman of the Ontario Editorial Board wishes to thank the various contributors to the "News Items" column of the *Journal*. It is the hope that in this column will be found in the future details of interest to all the profession, and we are asking for their continued support.

THE last meeting for the season of the Northumberland and Durham Medical Society was held in Port Hope, Wednesday, October 26th. Dr. Roscoe R. Graham of Toronto gave a most excellent address on the subject "Chronic Abdominal Disease," which was much appreciated by all the members present. In the evening session Dr. A. S. Tilley of Bowmanville gave an instructive paper on a case of "Osteomyelitis following an injury."

BRITISH COLUMBIA

THE British Columbia Medical Association has secured as its executive secretary Mr. C. J. Fletcher who will take office on the first of December. Mr. Fletcher has been with the medical department of the Soldiers' Civil Re-establishment at Vancouver as chief clerk, and should already be well known to a large number of the physicians of British Columbia. It is to be hoped that the organization of the medical profession of British Columbia will shortly be effected, and that it will be possible by means of the *Journal* to furnish news and chronicle the activities of the province.

THE Vancouver Medical Association opened the season on October 10th with an address by Dr. R. T. Leiper of the London School of Tropical Medicine on "Helminthology," which was illustrated by lantern slides. The dinner of the Association, regarded as always a superlative function, was held on the evening of November 10th, and maintained the tradition.

THE first fortnightly luncheon under the auspices of the Health Bureau of the Board of Trade was held on November 2nd, when Dr. Howard Spohn spoke on "Infant Welfare" and emphasized the importance of certified milk and pre-natal care, the latter involving the determination of the Wassermann reaction as a routine measure in obstetrical cases in hospitals.

IN a report from the daily paper a suit against Dr. John Christie of Ocean Falls, B.C., for unstated damages in consequence of an alleged wrong diagnosis was dismissed by Mr. Justice Murphy. The particulars of this suit are not available.

DR. L. BROE of Anyox, B.C., has removed to Yarrow, B.C., and Dr. Paul Whelan, a graduate of the University of Pennsylvania, has replaced him at Anyox, B.C.

Book Reviews

PARASITOLOGIE HUMAINE. By M. NEVEU-LEMAIRE. Fifth edition, 466 pages, 313 figures. Price 24.50 francs. Published by J. Lamarre, 4, Rue Antoine-Dubois, Paris.

Every Canadian physician should speak French; he should do so if only because that is the language of one-third of the population of Canada. Osler never tired in urging his young men to do some of their reading in a language other than English.

"Parasitology" is an indefinite term. In a medical sense, it usually refers to the study of organisms, other than bacteria, which cause human disease. As their importance in human pathology has become recognized, so has the study of them increased until now the Association of American Medical Colleges recommends that forty hours in the under-graduate course be devoted to parasitology.

There is no book in English exactly like Neveu-

Lemaire's. It is compact yet comprehensive; it contains in a small compass all that a student requires. It is well illustrated. As a rule, although there are exceptions, its conservatism and its conciseness of statement make it a very valuable and safe book for the library of the medical man, and more especially for the working library of a medical student.

J. L. T.

PHYSICAL DIAGNOSIS. By W. D. Ross, M.D., Lecturer on Physical Diagnosis and Associate Professor of Medicine in the University of Arkansas. Second edition. Pages 736; 8vo.; 309 illustrations. St. Louis, 1921: C. V. Mosby Co.

The first edition of this book appeared in 1917. It has been revised and largely rewritten, with the addition of many new illustrations. Though treating principally the exploration of the chest and abdomen, there has been included the principal diagnostic signs referable to the head, neck, limbs and nervous system. In the latter we note an outline of the methods used in eliciting the vestibular reactions.

The general text of the work is good, and there is noticeable throughout the book an attempt to correlate the anatomy, pathology and physical signs.

The book is bulky because of the large type and wide spacing, and heavy because of the paper used to secure clearness of the many excellent illustrations. As a consequence it becomes a text and reference book rather than a handbook for students. As such, in spite of its many excellent qualities, it will bear much revision. We can see no reason for the inclusion of roentgenograms of fractures and other surgical conditions in a work which makes no other reference to these conditions. Tophi are defined as concretions of sodium biurate which occur in the joints of the fingers in gouty subjects. Under the heading "enlarged joints" we find but three lines. "Enlargement of the joints of the fingers is seen in connection with gout and chronic rheumatism" is one sentence. The statement that clubbing of the fingers notably accompanies chronic bronchitis, emphysema and phthisis, is not the teaching of most writers in medicine. Though Raynaud's disease receives reference and the fingers are described as bluish-black or livid with gangrene occurring in spots, no mention is made of the more common conditions of blanching of one or more fingers. On page 616 it is said that cyanosis of the lips may be "indicative of regurgitant heart disease." Surely in

aortic regurgitation pallor is to be seen rather than cyanosis. Again we find short descriptions of club foot, housemaid's knee and other conditions which are usually considered in the realm of surgery, yet we can find no reference to such an important diagnostic procedure as digital examination of the rectum.

With many good points, the work leaves much to be desired.

J. H. E.

TUBERCULOSIS AND HOW TO COMBAT IT. By F. M. POTTENGER, M.D., LL.D. 8vo.; 273 pages. St. Louis: C. V. Mosby Co., 1921. Price \$2.00.

This book represents the substance of Pottenger's talks to his Sanatorium patients. It is recognized that success in the treatment of tuberculosis depends greatly upon the co-operation of the patient with the physician, and this can be best secured by instructing the patient both in the nature of the disease and in the measures which have proven of value in treatment and in prevention. It is a splendid addition to the group of books already available to place in the patient's hands. We congratulate the author, who, writing from Southern California, has the frankness to say "There is no specific climate for the treatment of tuberculosis. It can be treated successfully anywhere."

J. H. E.

NUTRITION AND CLINICAL DIETETICS. By HERBERT S. CARTER, M.A., M.D., Assistant Professor of Medicine, Columbia University; Paul E. Howe, M.A. Ph.D., Rockefeller Institute for Medical Research and later Officer in Charge of Laboratory of Nutrition Army Medical School, Washington, D.C.; and Howard H. Mason, A.B., M.D., Instructor in Diseases of Children, Columbia University. Second edition, revised. Pages xvi and 703. 1921 Philadelphia and New York: Lea and Febiger. Price \$7.50.

In this new edition the subject matter has been brought well up to date. In addition to the authors' own conclusions as to diet, there is included most of the recent work on diet and nutrition, while the standard tables of food values and chemical composition of foods published by Atwater and Bryant, Irving Fisher and Pattee have been incorporated. The subject matter appears in four main divisions: 1, Foods and Normal Nutrition; 2, a discussion of Foods; 3, Feeding in Infancy and Childhood; 4, Feeding in Disease.

The diet in old age scarcely receives the attention it warrants and diet in the diseases of child-

hood is given much less attention than we would expect when one of the authors is a pædiatrician.

Without much that is new or original, the book summarizes the literature and our knowledge of dietetics up to 1918 in a comprehensive manner. The Canadian literature has not been overlooked

J. H. E.

A PRIMER FOR DIABETIC PATIENTS. A Brief Outline of the Principles of Diabetic Treatment, Sample Menus, Recipes and Food Tables. By RUSSELL M. WILDER, M.D., MAY A. FOLEY, and DAISY ELLITHORPE, Dietetians, the Mayo Clinic. 12mo of 76 pages. Philadelphia and London: W. B. Saunders Company, 1921. Cloth, \$1.50 net.

This small primer contains outline of the principles underlying the dietary treatment of diabetes, and is suitable for placing in the hands of patients. The urinary tests are given, the dietary plan explained and sample diets given with recipes for special dishes. It is pointed out that the primer is only to be used by patients who are trained and whose carbohydrate tolerance is known.

J. H. E.

McGILL'S HEROIC PAST, 1821-1921. By MAUDE SEYMOUR ABBOTT, B.A., M.D. 30 pages, 13 illustrations. 1921. Montreal: McGill University Publications. Price \$1.00.

This sketch of the foundation of McGill is particularly interesting to the medical profession, in that it gives the story of the foundation of the Montreal Medical Institution, and how it became the Medical Faculty of McGill, the first teaching Faculty, and the first Faculty to grant a degree.

Dr. Abbott has based this historic outline upon researches made in the Canadian Archives, the Sulpician library and elsewhere, by herself and others during the past two decades. The documents, letters and authorities quoted form a storehouse of information relating to the development of the University.

It is another of Dr. Abbott's splendid contributions to Canadian medical history. Published on the occasion of the centenary celebration, it should find an eager audience among both McGill Alumni and all interested in the development of medical education in Canada. The illustrations are excellent and the cover design most attractive.

J. H. E.

Books Received

The following books have been received, and the courtesy of the publishers in sending them is duly acknowledged. Reviews will be made from time to time of books selected from those which have been received.

DISEASES OF CHILDREN. Designed for the Use of Students and Practitioners of Medicine. By HERMAN B. SHEFFIELD, M.D. 798 pages with 238 illustrations, most original, and nine colour plates. Price \$9.00. Publishers: C. V. Mosby Co., 801-809 Metropolitan Bldg., St. Louis, U.S.A., 1921.

CHEMICAL DISINFECTION AND STERILIZATION. A Collection and Summary of Some of the more important Applications of General Methods which have interested the Authors from time to time. By Samuel Rideal, D.Sc. (Lond.) and Eric K. Rideal, D.Sc. (Lond.), M.A. (Cantab.) 313 pages. Publishers: Edward Arnold & Co., London, Eng., 1921.

THE HOT SPRINGS OF NEW ZEALAND. Written to bring before the notice of the medical profes-

sion the value of the Mineral Waters of New Zealand. By Arthur Stanley Herbert, O.B.E., M.D., B.S. (Lond.) 284 pages, with three maps and 87 illustrations. Price 15s. net; also in paper covers, 14s. net. Publishers: H. K. Lewis & Co., Ltd., 28 Gower Place, London, W.C.1., Eng., 1921.

A POCKET SURGERY. Summary of the Whole Range of Examination Surgery. By Duncan C. L. Fitzwilliams, C.M.G., M.D., Ch.M., F.R.C.S. (Edin. and Eng.). 348 pages. Price 10s. 6d. net. Publishers: Edward Arnold & Co., 41 and 43 Maddox St., London, W., Eng., 1921.

OPERATIVE DENTAL SURGERY. Being the substance of a short course of lectures to the students of the Dental School of Guy's Hospital. By J. B. PARFITT, L.R.C.P., M.R.C.S., L.D.S. 319 pages, illustrated. Price, 21s. net. Publishers: Edward Arnold & Co., London, Eng., 1921.

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FOUR BOOKS of OUTSTANDING MERIT

MIDWIFERY AND THE DISEASES OF WOMEN, By John S. Fairbairn, M.A., B.M., F.R.C.P., F.R.C.S. About 1000 pages, \$19.50.

The British Medical Journal says:—"It is eminently calculated to be helpful to the practitioner as a work of ready reference, and as its merits become known it is assured of a wide circulation and an increasing popularity. It is manifestly the outcome of a great deal of thought on the part of the Editor as to the actual needs of those for whose use it is primarily designed, as well as in the arrangement of the matter, which is in some respects unique. It is a mine of accurate information, and its teaching is based upon an enormous collective experience gleaned from practically all the medical schools of the United Kingdom. We conclude as we began by congratulating Dr. Fairbairn on a monumental achievement."

DISEASES OF THE SKIN, By Richard L. Sutton, M.D., Professor of Diseases of the Skin, University of Kansas School of Medicine. New fourth edition. 1133 pages, 969 illustrations, \$10.50.

The British Journal of Dermatology says:—"Dr. Sutton's books are so well known and appreciated that nothing is wanting to recommend this new edition to those familiar with the earlier works. The illustrations are so numerous as to entitle the work to be classified as an atlas of skin diseases; in fact, there are few atlases which contain so complete a pictorial record of the whole field of Dermatology. The author and publishers are to be congratulated not only on having secured such a large collection, but on the excellence of their reproduction."

INDISPENSABLE ORTHOPÆDICS, By L. Calot, Chief Surgeon to the Hospital Rothschild, 1108 pages, 1140 illustrations, 2 vols. \$14.00.

"The keynote of the book is cure without recourse to surgical operation. The author's methods are clearly explained throughout. The name of Calot is, of course, a guarantee of soundness, and his style is picturesque and vivid. The translation was admirably done and the illustrations can scarcely be excelled."

The Medical Press says:—"Dr. Calot's viewpoint in its new English guise loses none of its attraction, and every practitioner and surgeon should have this volume on an easily accessible bookshelf."

THE OXFORD INDEX OF THERAPEUTICS Edited by Victor E. Sorapure, M.D., Ch. B., F.R.C.S., with over seventy contributors. 1144 pages, illustrated, \$10.50.

This is truly one of the important books of the year for the general practitioner. It is broadly international in its character, and deals very specifically and directly with the all important question of treatment. The author's wide experience in both Great Britain and the United States, admirably fits him for an achievement which has been so successfully accomplished. Considering the vast amount of material, scope of its contents and the high standing of the contributors, the book is remarkably low in price. An unusually large advance sale has made this possible.

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Chairman of the Editorial Board: DR. A. D. BLACKADER

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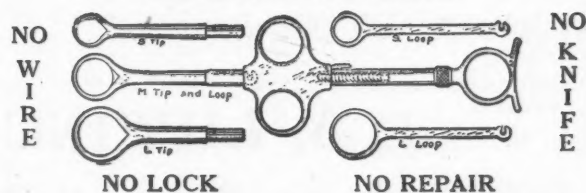
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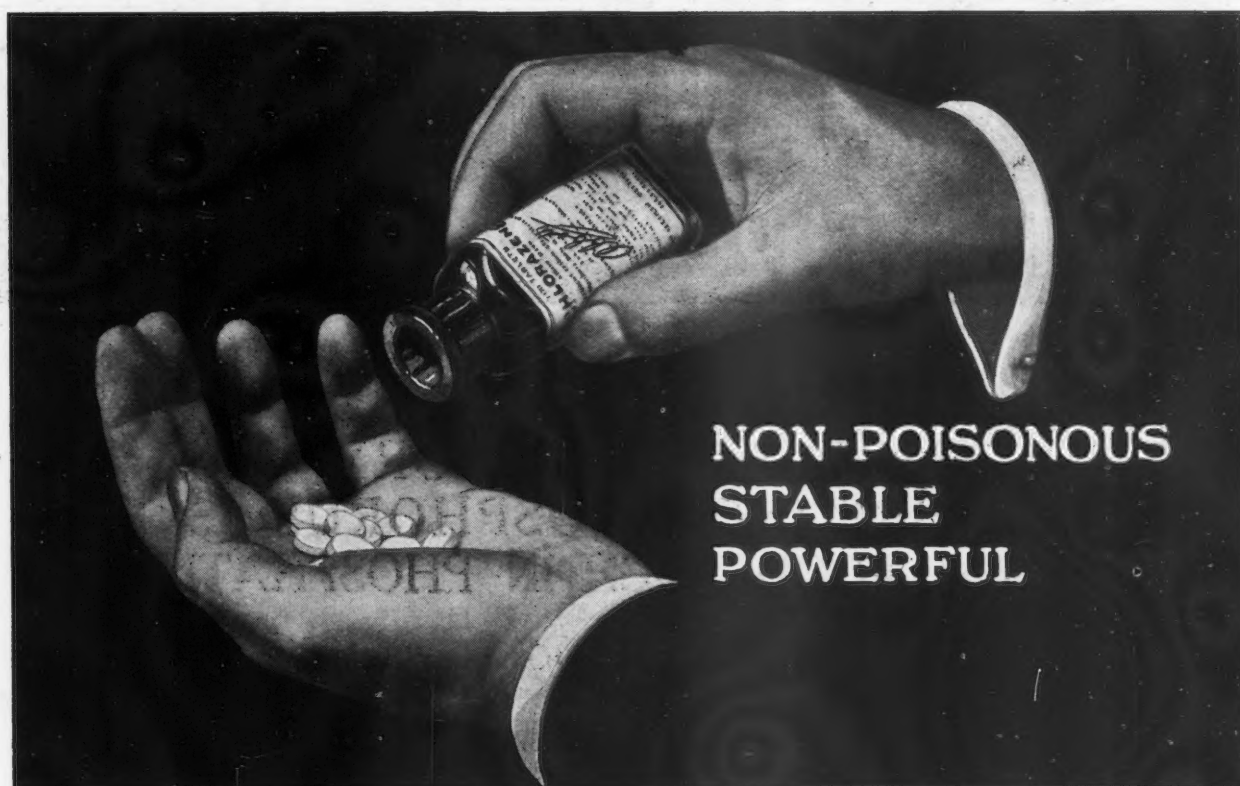
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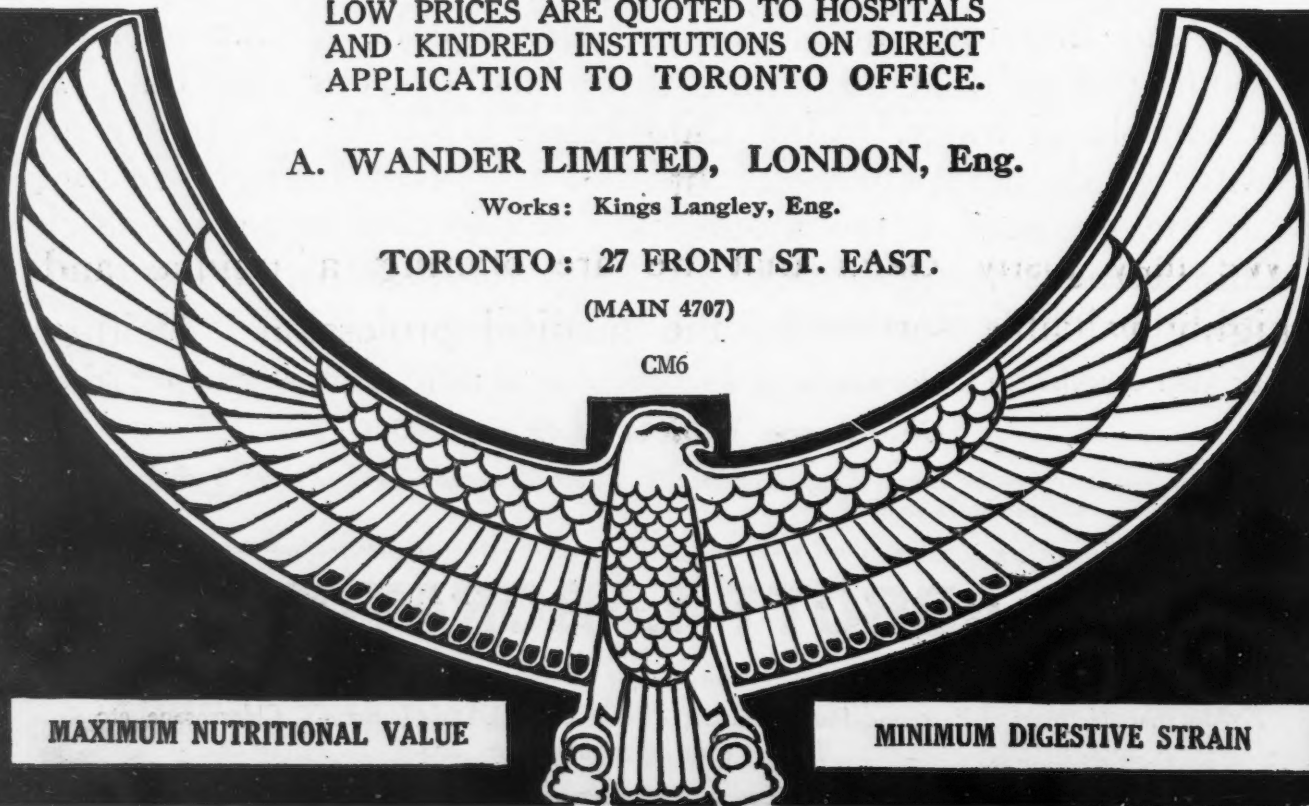
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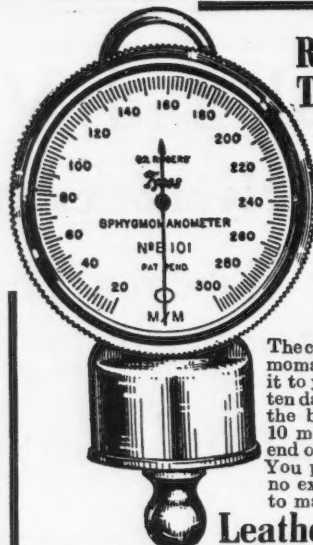
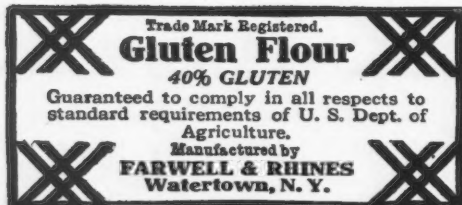
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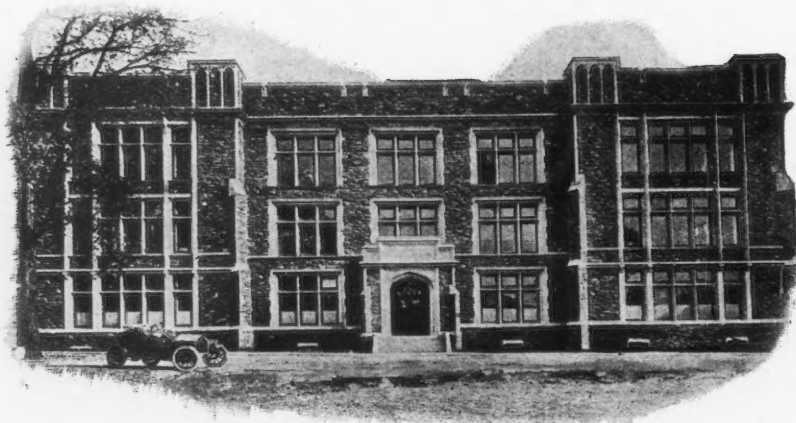
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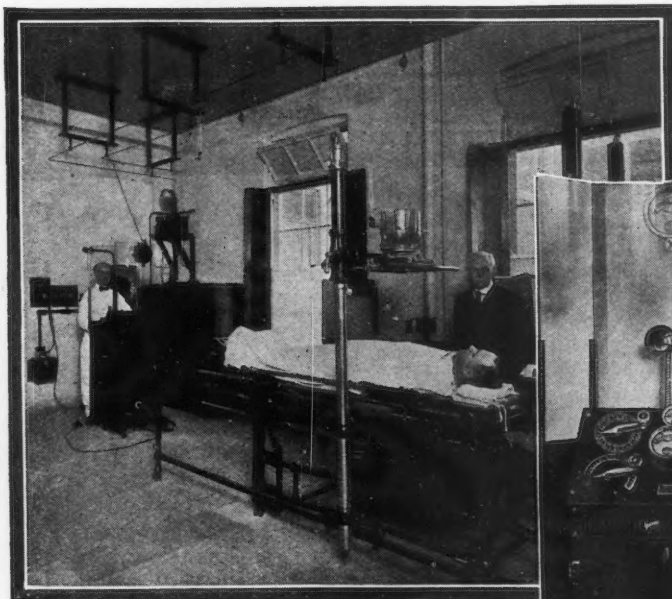
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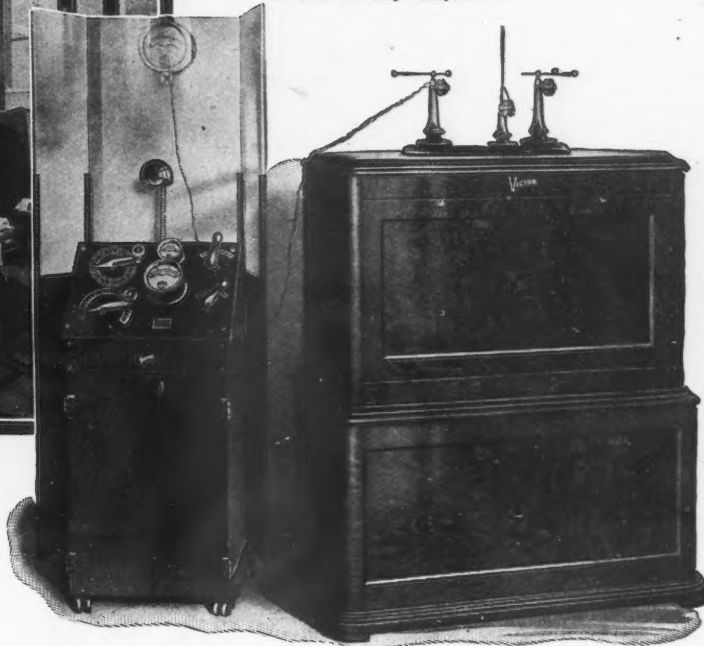
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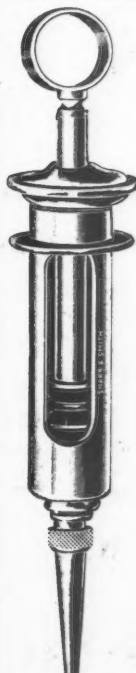
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